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Lewis and Clark County traffic safety improvement study

LEWIS & CLARK COUNTY

Traffic Safety Improvement Plan

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Prepared For

Lewis & Clark County
and
Highway Traffic Safety Division of the
Montana Department of Justice

November 30, 1988

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LEWIS AND CLARK COUNTY TRAFFIC SAFETY IMPROVEMENT STUDY

Prepared For:

LEWIS AND CLARK COUNTY

In Cooperation With:

MONTANA DEPARTMENT OF JUSTICE,
HIGHWAY TRAFFIC SAFETY DIVISION

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November, 1988

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CHAPTER I

INTRODUCTION

A. PURPOSE

The purpose of this report is to analyze the cause of accidents at locations on the county road system where accident reports indicate a cluster of accidents, and to develop an improvement plan for those locations.

B. COUNTY ROAD ACCIDENT HISTORY

The road system in Lewis and Clark County can be divided into three categories:

1) on-system roads which are part of the Federal Aid Highway System and are under the jurisdiction of the Montana Department of Highways;
2) off-system roads that come under the jurisdiction of federal or state agencies such as the Forest Service, Bureau of Land Management, or Fish, Wildlife and Parks; and

3) off-system roads that come under the jurisdiction of Lewis and Clark County.

This study covers the roads in category 3.

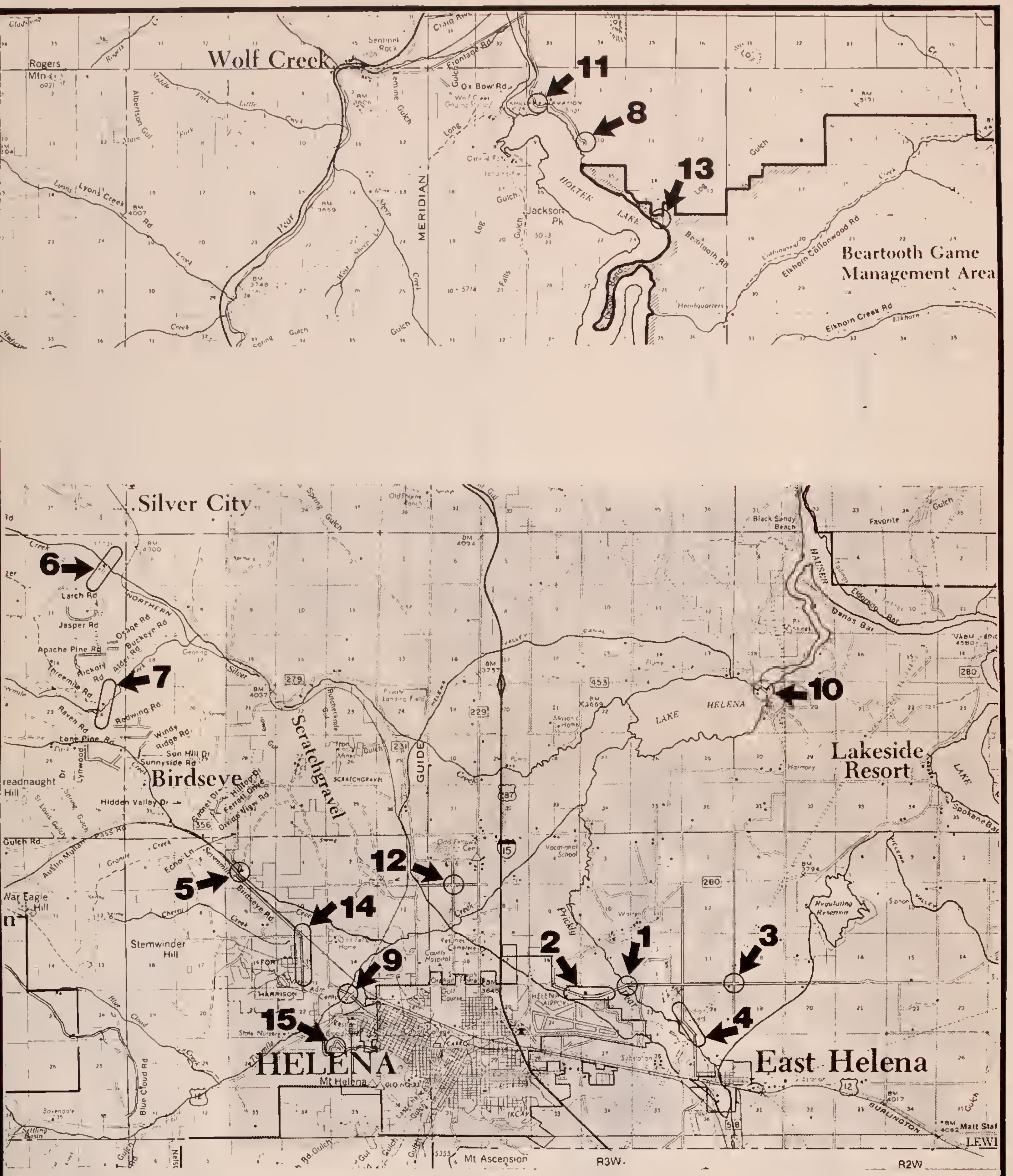
The Lewis and Clark County rural road system has 1,496 miles of road, of which 1,045 miles are dirt or gravel surfaced and 451 miles are paved. The average road mileage for the 56 counties in Montana is 1,343 miles with an average of 1,099 miles with dirt or gravel surfaces and 244 miles paved. Lewis and Clark County has 11 percent more county road than the average county in the state, ranking twenty-second in the state in the number of road miles under county jurisdiction.

During the four-year period from January 1984 through December 1987, 5,110 reported accidents occurred in Lewis and Clark County. These accidents resulted in 1,964 injuries and 41 fatalities. Accidents on the road system under jurisdiction of Lewis and Clark County accounted for 1,850 reported accidents with 1,032 injuries and 27 fatalities.

The 1985 estimated population of Lewis and Clark County was 46,100. During the four-year period from 1984 through 1987, Lewis and Clark County had 0.040 accidents per person on the road system under jurisdiction.

C. COUNTY ACCIDENT LOCATIONS

The Department of Justice maintains records of all reported accidents in the state. The consultant tabulated the accidents on the county road system by location. Locations with clusters of accidents were analyzed to arrive at 15 locations where a detailed analysis was carried out. Based on the analysis, short- and long-term improvements were developed for each site. Chapter II explains the study methods in detail. The locations of the sites are shown on Figure 1A on the following page.



Site Location Map

LEWIS & CLARK COUNTY, MT.

FIG. NO. 1–A

CHAPTER II

STUDY METHODS

The determination of improvements required to reduce accidents at the selected sites involves eight basic steps. These are outlined in the following sections.

A. ACCIDENT ANALYSIS

Department of Justice records were used to obtain the accident reports at each of the selected sites. The accident reports were reviewed and pertinent information was plotted on a preliminary sketch of each location. This information included: a symbolic sketch showing vehicle paths, point of collision, collision type, time of day, road condition, and number of injuries or fatalities. The sketches were used to determine trends and patterns.

B. PRELIMINARY FIELD SURVEY

The consultant prepared a list of 36 sites based on the location of accident clusters. These were reviewed with the Highway Traffic Safety

Division, Traffic Engineer, the Lewis and Clark County Road Superintendent and the County Surveyor. The list was reduced to 15 sites. A detailed survey was made at these sites.

C. DETAILED FIELD SURVEY

A two-man survey crew visited each site to collect detailed data. The following information was collected:

1. Site Survey

Each site was surveyed so that an accurate plan of the site could be prepared showing roadway alignment, grades, superelevations, and other physical characteristics. Surrounding topography was also surveyed showing sign and other traffic control device locations, fences, utility poles, trees, and other roadside objects. The survey was extended to take in all features which could have an effect on the road user such as background roads that appear to be an extension of the roadway or utility lines or waterways which continue straight while the roadway turns. These features sometimes cause false driver expectancy resulting in off-road accidents.

2. Traffic Counts

Mechanical traffic counts were taken at sites where Montana Department of Highways traffic counts were not available. The counts were converted to 1988 Average Daily Traffic by applying annual and seasonal adjustment factors.

3. Sight Distance

The driver sight distance on all approaches at each site was measured.

4. Safe Speed Study

A ball bank indicator was used to determine the safe speed on horizontal curves. This instrument measures the overturning force on a vehicle and limits at which riding discomfort and loss of vehicle control begin.

5. Driver Expectancy and Information System Evaluation

Each member of the survey crew independently rated the driver expectancy and informational system of each site.

Driver expectancy is a measure of a driver's perception of the roadway and the amount of time a driver has to react and take the necessary

actions to pass safely through the location. The rating ranges from no unexpected or unusual actions required to very unusual situations which would surprise many unfamiliar drivers.

The information system evaluation consisted of determining if the roadway design and traffic control devices were sufficient to give the driver the information required in sufficient time to take the necessary actions to safely negotiate the location. Ratings for the information system range from easy and obvious information interpretation to the lack of important information.

The evaluation forms used for the driver expectancy and information system evaluation are shown in Figures 1 and 2.

6. Site Sketches

The field survey data was used to prepare a sketch of each site showing the pertinent features. These include alignment, grade, roadway dimensions, approaches, ditches, foliage, roadside objects, traffic control devices, surface type and condition, sight distance and surrounding features that may affect the function of the roadway. The sketches have been used as a base to show the existing conditions, accident diagrams and recommended improvements contained in the site analysis section of this report (Chapter IV).

D. CALCULATE HAZARD INDEX

A hazard index was calculated for each site. The hazard index calculation form along with the various indicator values are shown in Figures 3 through 10. The factors entering into the hazard index calculation are as follows: (all figures and tables are at the end of this chapter)

1. Number of Accidents

The average annual number of accidents for the four-year period from 1984 through 1987 was used to calculate this indicator (see Figure 3).

2. Accident Rate

The accident rate is expressed in accidents per million vehicle miles of travel. The average daily traffic (ADT) as determined from the mechanical counts were used to compute this indicator (see Figure 4).

3. Accident Severity

Accident severity relates property damages, bodily injuries and fatalities to dollar costs. The unit costs shown in Figure 5 were used to calculate this indicator (see Figure 5 and Table 3).

4. Volume/Capacity Ratio

The 1988 average daily traffic and the 24-hour capacity (Level of Service) as calculated using the methods set forth in the 1985 Highway Capacity Manual were used to calculate this indicator (see Figure 6).

5. Sight Distance

Sight distances on all approaches were determined by the field survey. This was related to the required stopping distance to determine the indicator value of each location (see Figure 7).

6. Driver Expectancy Problems and Information System Deficiencies

The average rating values from the two independent field ratings were used to determine the values for these two indicators (see Figures 1, 2, 8, and 9).

7. Hazard Index

The hazard index for each site was calculated by combining the seven hazard rating indices. The hazardousness of each location was used to rank the sites.

E. DEVELOP RECOMMENDED IMPROVEMENT PLANS

A recommended improvement plan has been developed based on the layout sketch, accident analysis, field notes, traffic volumes and movements, photos, site inspections, and local interviews. The improvements are shown on the location sketch for each site contained in Chapter IV.

F. COSTS

Costs provided by the Montana Department of Highways as approved by the Federal Highway Administration will be paid to the county under a "Work at Agreed Price" contract. The approved costs have been used to determine improvement costs at each site. The costs are shown in Table 1.

The costs in Table 4 are used to determine the cost factor which is the improvement cost per vehicle entering the site over a five-year period. The five-year period represents the reasonable design life of the improvements.

Figure 10 is used to determine the cost factor for each site.

TABLE 1

SAFETY PROJECT COSTS - APPROVED BY FHWA, MARCH 6, 1988

A. Signs

1)	1 square foot to 6 square feet	$ 100.00
2)	6.1 square feet to 10 square feet	140.00
3)	10.1 square feet to 20 square feet	170.00

B. Delineators

1)	Design "A" metal posts	$ 9.25
2)	Design "A" flexible posts - 6'	20.00
3)	Design "A" flexible posts - 27"	6.00

C. Guardrail

1)	New "W" beam rail	$ 8.00 per foot
2)	"W" beam end treatment incl. anchor	1,000.00 each
3)	New concrete rail	16.00 per foot
4)	Concrete end tapers	16.00 per foot

G. CALCULATE PRIORITY INDEX

The priority index is determined by combining the hazard index and the cost index. The hazard index is given a 75 percent weight and the cost index is weighted 25 percent. These calculations are shown in Chapter IV. The priority index is used to rank each site as shown in the priority listing in Chapter III.

H. BENEFIT/COST ANALYSIS

The Montana Department of Highways calculates the Benefit/Cost Ratio of safety improvements in order to set priorities for on-system projects. The Benefit/Cost Ratio for each site has been calculated using the MDOH method.

Figure 1

DRIVER EXPECTANCY PROBLEMS RATING FORM

Ratings

0 -- Nothing expected or unusual at this location.
Actions required (if any) entirely consistent with driving strategy on approach.
Standard geometry, with pathway(s) for intended movement(s) clearly evident.
No interferences by other traffic likely.

1 --

2 --

3 -- Situation somewhat unexpected.
Driver must be alert, but should be able to respond adequately at "last minute" to most combinations or adverse circumstances.
Some initial confusion on intended path(s) or movements(s).
Interference from other traffic may create some degree of confusion or uncertainty for average driver.

4 --

5 --

6 -- Very unusual situation; will "surprise" many unfamiliar drivers.
Driver required to make major change in driving tactics from those employed over past few miles.
At least a "near accident" almost expected if driver is even moderately inattentive; evasive actions likely to be required.
Intended pathway(s) confusing under fairly normal traffic or lighting conditions.
Other traffic, or lack of it, aggravates situation and misleads driver or deprives him of important cues.

Approach

Rating

	0	1	2	3	4	5	6
A	x--------	x--------	x--------	x--------	x--------	x--------	x
B	x--------	x--------	x--------	x--------	x--------	x--------	x
C	x--------	x--------	x--------	x--------	x--------	x--------	x
D	x--------	x--------	x--------	x--------	x--------	x--------	x

Source: Identification of Hazardous Locations, Report No. FHWA-RD-77-83

Figure 2

INFORMATION SYSTEM DEFICIENCIES RATING FORM

Ratings

0 -- Information for required decisions complete and ambiguous.
Signs, markings, delineation in good repair, clean, highly visible.
"Positive guidance" leads driver to appropriate path; makes error difficult.
Approach speeds of most drivers are appropriate.
Light decision load; easy, and obvious.

1 --

2 --

3 -- Some information lacking or somewhat misleading.
Signs should be moved or augmented for better visibility or to provide more decision time.
Visibility of signs, markings, and delineation barely adequate.
Advisory speed information should be changed slightly, or added.
Medium decision load; average driver will be able to handle situation, but may be a little uncomfortable.

4 --

5 --

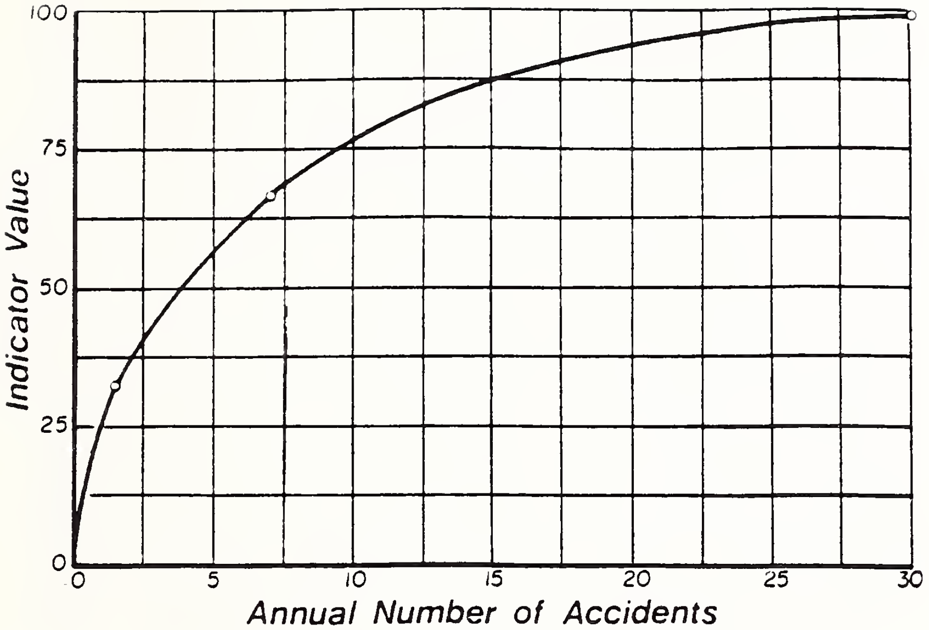
6 -- Important information missing.
Complete new "information system" needed -- design and installation.
Present signs and markings in very poor condition; need replacement.
Speed limit and/or advisory speed needed; either missing or totally inappropriate at present.
"Positive guidance" on appropriate path lacking; a clutter of negative delineation only.
Heavy decision load; complete attention of average driver required; a "tense" situation at best.

Approach

Rating

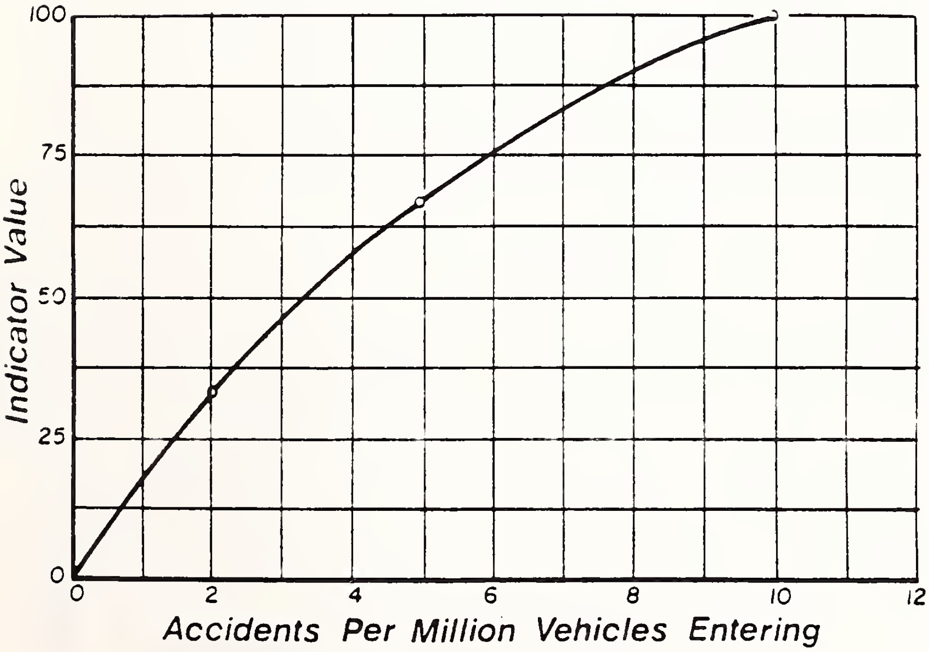
	0	1	2	3	4	5	6
A	x	x	x	x	x	x	x
B	x	x	x	x	x	x	x
C	x	x	x	x	x	x	x
D	x	x	x	x	x	x	x

Source: Identification of Hazardous Locations, Report No. FHWA-RD-77-83



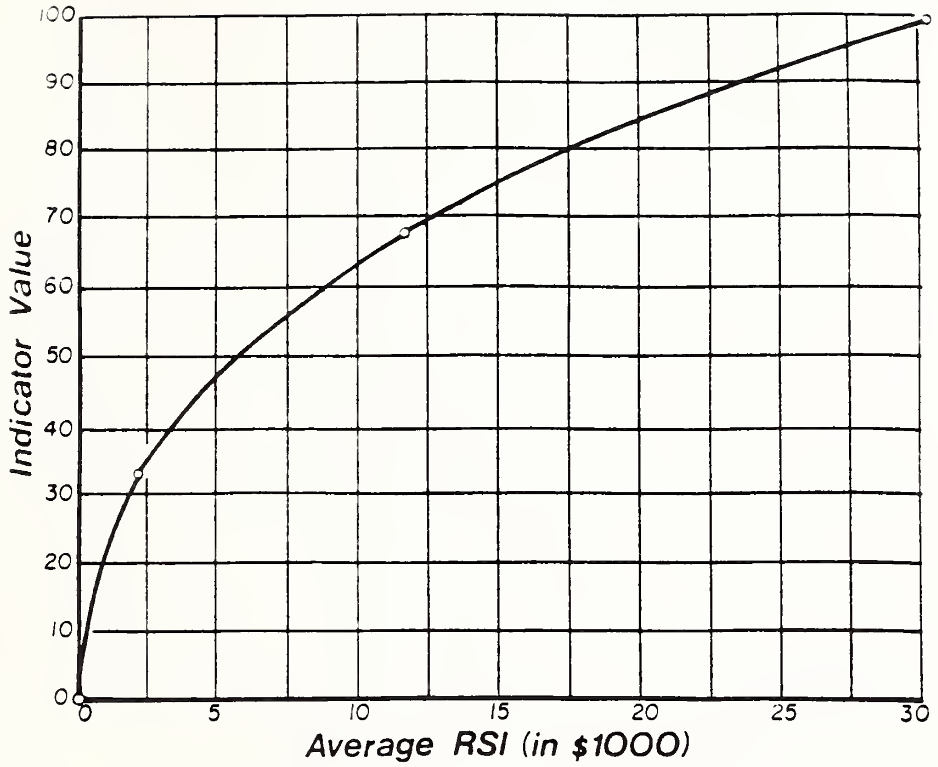
INDICATOR VALUES FOR NUMBER OF ACCIDENTS

Figure 3



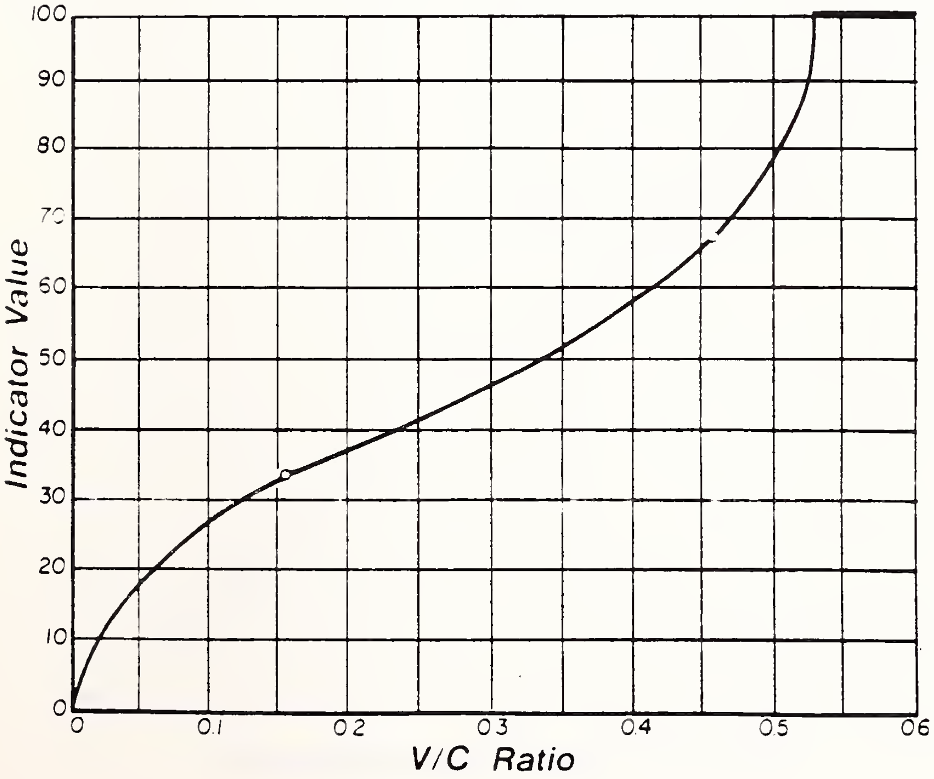
INDICATOR VALUES FOR ACCIDENT RATE

Figure 4



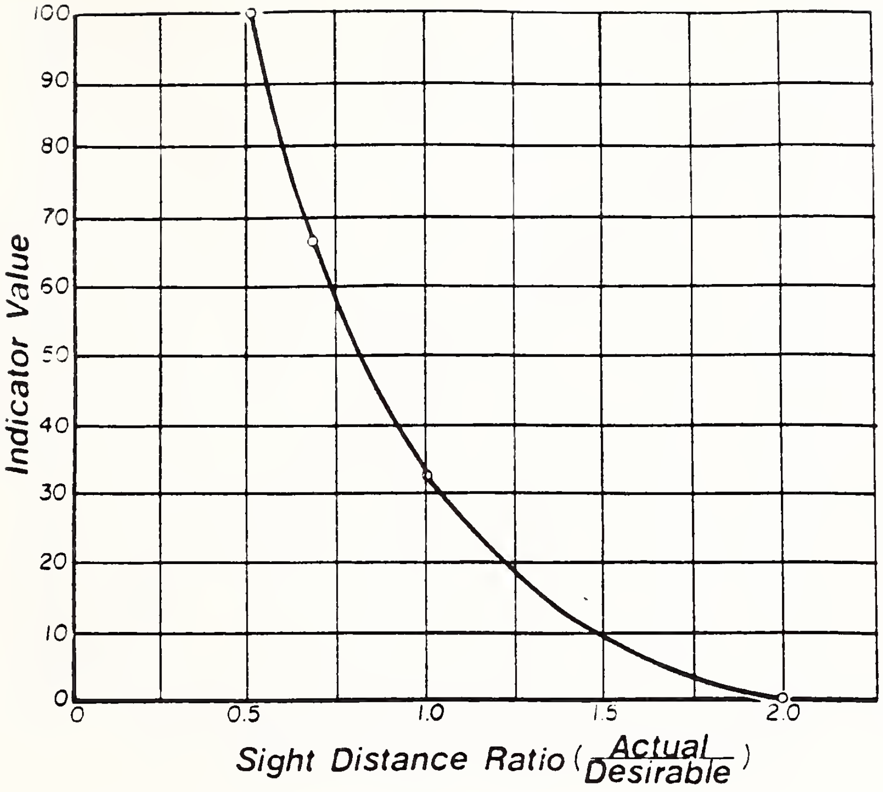
INDICATOR VALUE FOR
ACCIDENT SEVERITY

Figure 5



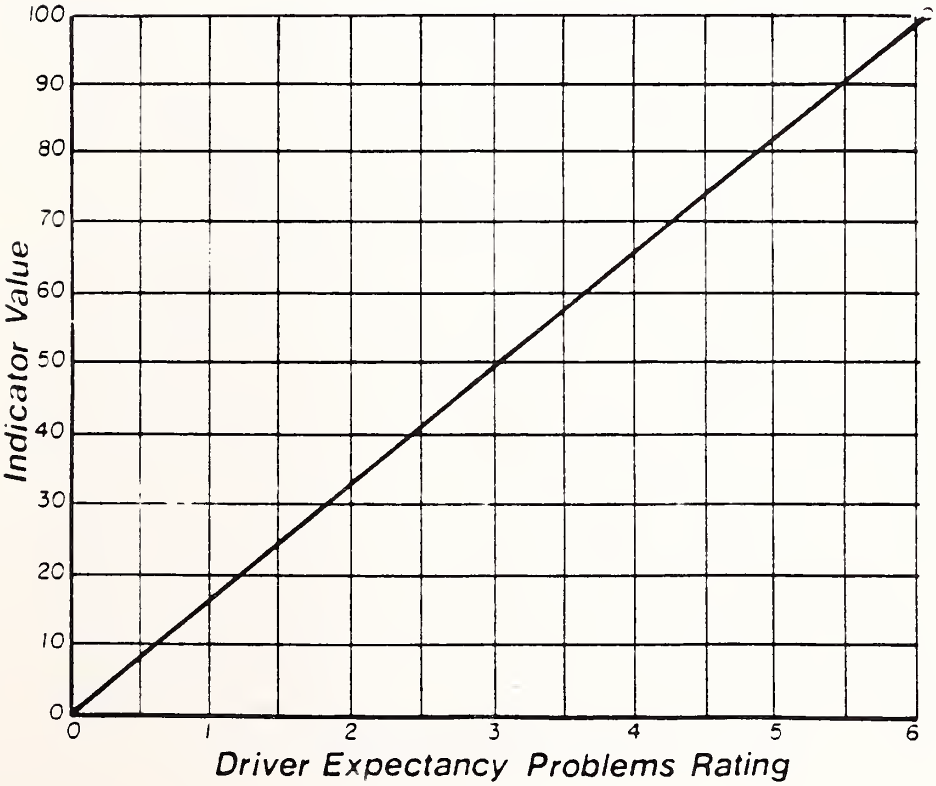
INDICATOR VALUES FOR
V/C RATIO

Figure 6



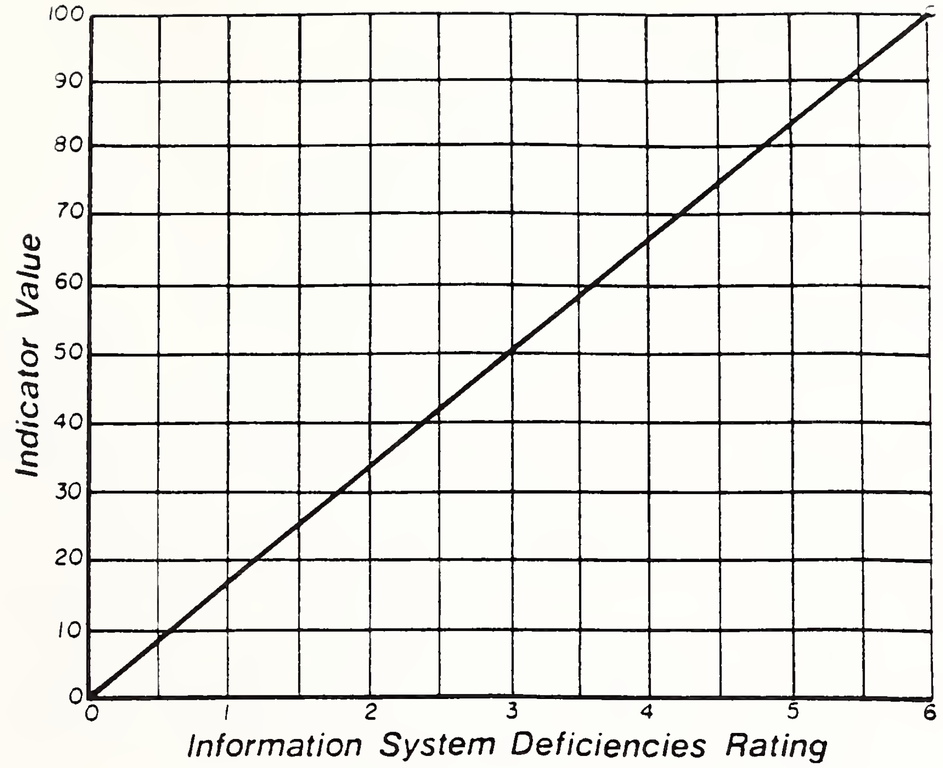
INDICATOR VALUES FOR
SIGHT DISTANCE

Figure 7



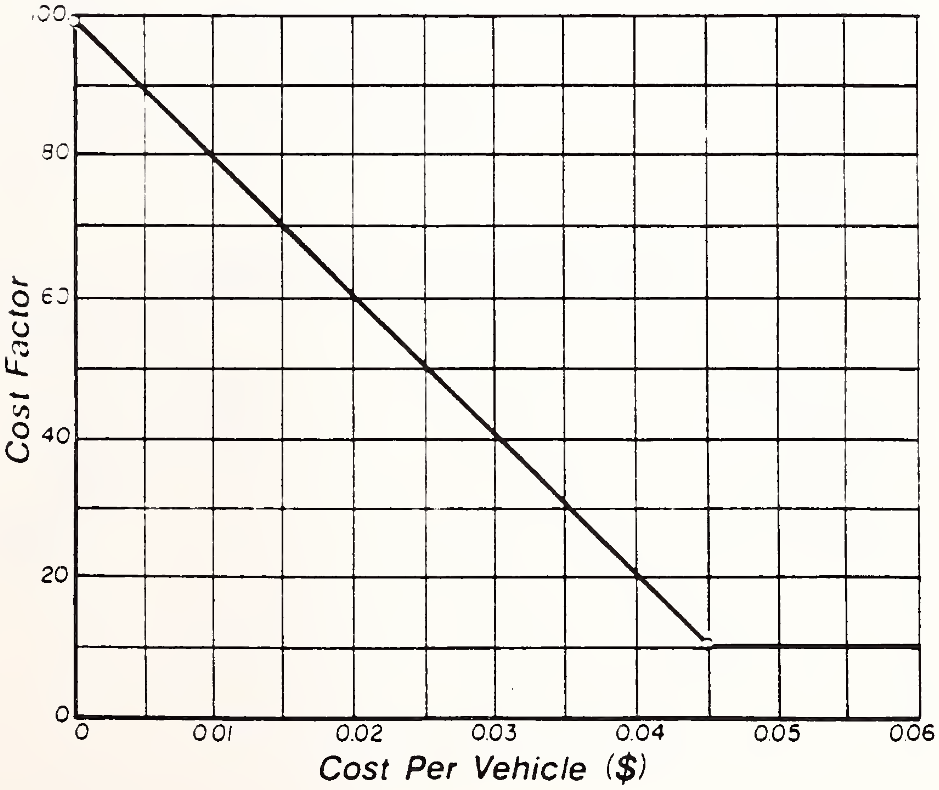
INDICATOR VALUES FOR
DRIVER EXPECTANCY

Figure 8



INDICATOR VALUES FOR INFORMATION SYSTEM DEFICIENCIES

Figure 9



FORM FOR DETERMINATION OF COST FACTOR

Figure 10

TABLE 2

RELATIVE SEVERITY INDEX

	RSI	
TYPE OF ACCIDENT	Urban	Rural
Multi-Vehicle, At Intersection		
Enter at angle	$ 4,300	$14,400
From same direction - both going straight	2,800	5,100
From same direction - one turn, one straight	2,500	5,100
From same direction - one stopped	3,800	5,200
From same direction - all others	2,000	6,300
From opposite direction - both going straight	4,400	20,000
From opposite direction - one left turn, one straight	4,400	15,400
From opposite directions - all others	2,700	3,800
Not stated	3,800	5,200
Multi-Vehicle, Non-Intersection		
Going opposite direction - both moving	$ 4,400	$19,600
Going same direction - both moving	2,900	8,100
One car parked	1,600	2,400
One car stopped in traffic	4,200	6,800
One car entering parked position	1,900	2,300
One car leaving parked position	1,200	2,700
One car entering alley or driveway	3,400	6,000
One car leaving alley or driveway	2,000	4,400
All others	1,700	7,600
Not stated	3,400	6,000
Motor Vehicle with Pedestrian, At Intersection and Non-Intersection		
Vehicle going straight	$20,000	$49,000
Vehicle turning right	13,600	11,200
Vehicle turning left	17,100	11,200
Vehicle backing	20,600	11,200
All others	14,500	11,200
Not stated	11,200	11,200

TABLE 2

RELATIVE SEVERITY INDEX (Continued)

TYPE OF ACCIDENT	RSI Urban	 Rural
Single Vehicle, at Intersection		
Collision with train	$26,700	$39,100
Collision with bicycle	13,100	31,900
Injury in vehicle, jacknifed	5,200	2,000
Collision with fixed object in road	5,500	7,000
Overturned in road	9,200	7,500
Left road	5,200	12,300
Single Vehicle, Non-Intersection		
Collision with train	$26,700	$39,100
Collision with bicycle	13,100	31,900
Injury in vehicle, jacknifed	5,200	2,000
Collision with fixed object in road	6,300	9,200
Overturned in road	10,000	9,400
Left road at curve	7,600	12,400
Left road on straight road	5,200	10,500
Other One Motor Vehicle, At Intersection and Non-Intersection		
Fell from moving vehicle	$15,000	$57,200
Collision with animal	4,800	1,800
Collision with other object	4,700	4,400
All others	5,200	2,000
Not stated	3,200	3,400

Source: National Safety Council

CHAPTER III

SUMMARY OF RECOMMENDATIONS

A. IMPROVEMENT PRIORITIES

Table 3 shows the final listing of improvement priorities based on the priority index which takes into account the hazardousness of each site and the cost of recommended improvements. The hazard index is given a 75 percent weight and the cost factor a 25 percent weight.

The Benefit/Cost Ratio calculated using the Montana Department of Highways' method is also shown for each site.

B. IMPLEMENTATION

The priority list should be used to develop an improvement schedule. The highest ranked site should be funded first and as funding becomes available, each site should be improved according to its respective rank.

TABLE 3

IMPROVEMENT PRIORITY LIST

Priority	Site No.	Location	Priority Index	Hazard Index	Cost	MDOH* Cost/Benefit
1	6	Birdseye Rd. - Curves	76.06	68.41	$ 740	22.19
2	15	Le Grande Cannon Blvd. - Curves	75.91	68.21	420	18.65
3	8	Beartooth Rd. - Curves	75.59	68.12	980	8.50
4	13	Beartooth Rd. - Curves	75.00	68.66	1,140	6.85
5	11	Beartooth Rd. - Hill and Curve	74.54	68.72	900	15.63
6	7	Birdseye Rd. - Three Mile Cr.	72.96	64.28	560	37.06
7	5	Birdseye Rd. - BNRR Crossing	68.91	58.88	780	12.73
8	10	Lake Helena Dr. - Causeway	68.48	58.31	1,040	21.42
9	1	Canyon Ferry Rd. - Prickly Pear Creek Bridge	64.75	53.34	400	102.17
10	4	Wylie Dr. - Curves	64.17	52.56	1,376	8.65
11	2	Canyon Ferry Rd. - Curves	60.64	47.85	560	88.35
12	3	Canyon Ferry Rd. - Valley Dr.	60.23	47.31	968	19.64
13	12	McHugh Dr. - Mill Rd.	60.10	47.13	600	23.44
14	14	Country Club Ave. - Williams St. - Birdseye Rd.	59.24	45.99	1,240	17.47
15	9	Country Club Ave. - Ten Mi. Cr.	54.68	39.91	5,160	4.07
					$16,864	

* Dollars in benefit for each dollar spent - based on Montana Dept. of Highways benefit/cost method

TABLE 4

LIST OF MATERIALS

Item	Sign No.	Size	Quantity
Stop Sign	R1-1	36"x36"	2
Speed Limit	R2-1	24"x30"	3
Turn Right	W1-1R	30"x30"	5
Turn Left	W1-1L	30"x30"	4
Curve Left	W1-2L	30"x30"	2
Reverse Turn Right	W1-3R	30"x30"	2
Winding Road	W1-5	30"x30"	2
Curve (180°)	W1-5a	30"x30"	2
Large Arrow	W1-6	48"x24"	17
Large Double Arrow	W1-7	48"x24"	1
Chevron Alignment	W1-8	18"x24"	6
Cross Road	W2-1	30"x30"	4
Side Road Right (45°)	W2-3R	30"x30"	1
Side Road Left (45°)	W2-3L	30"x30"	1
Stop Ahead	W3-1a	36"x36"	4
Yield Ahead	W3-2a	30"x30"	1
No Passing Zone	W14-3	36"x48"x48"	2
Advisory Speed Plate	W13-1	18"x18"	15
Playground	W15-1	36"x36"	2
Six-Foot Flexible Delineator, Design A	--		127
Approach Delineator, Design D	--		25
"W" Beam End Treatment, with Anchor	--		4
Reflector Guard Rail Washers	--		60

If funds are not available to complete all improvements, traffic control device installation should be funded first. These are generally the most cost-effective improvements and can be accomplished by the county maintenance crew. Widening, reconstruction or new construction improvements should be made as funding is available.

State law requires that all traffic control devices installed on the county road system conform to the standards set forth in the Manual on Uniform Traffic Control Devices for Streets and Highways (1978). The manual also specifies installation standards. By using uniform signs and markings and uniform placement, the driver becomes accustomed to obtaining clear information about the roadway by observing these devices.

An exchange of road construction and maintenance methods by counties throughout the state is a valuable source of information that may result in cost savings and statewide uniformity.

C. ONGOING PROGRAM

U.S. Bureau of Census, local population estimates show that Lewis and Clark County population has increased by 7 percent from 1980 to 1985. The 1985 population was estimated to be 46,100. Although this is not a rapid growth, most of the increase has occurred in the rural areas of

the county. This has caused an increase in traffic volumes on many of the low-volume county roads. As an example, Birdseye Road provides access to a rural residential area that has experienced rapid development. Five of the high accident locations are on Birdseye Road, Williams Street, and Country Club Avenue. Other developments such as the golf course on Valley Drive will increase traffic volumes on roads that are presently carrying relatively low volumes. For this reason, it is important that an ongoing program for safety improvements be maintained. The following is a summary of the ongoing safety improvement process.

1. Set up safety improvement schedule to implement recommended improvements set forth in this report, in order of priority and as funds become available.

2. Obtain annual plots of accidents occurring on county roads from the Montana Department of Justice, Highway Traffic Safety Division.

3. Use annual accident plots to evaluate effectiveness of safety improvements that have been implemented.

4. Use annual accident plots to determine high accident locations to be included in the ongoing safety improvement program.

5. Obtain detailed accident reports for the selected sites from the Department of Justice.

6. Develop ongoing improvement plan.

CHAPTER IV

SITE ANALYSIS

This chapter presents, in detail, the analysis of each of the sites. The information for each site consists of the following:

1. General location map showing site locations within the county;
2. Photos of the sites;
3. Sketch plan showing existing conditions;
4. Sketch plan showing recommended improvements;
5. Accident summary; and
6. Hazard index and priority index calculations.

SITE NO.1

Site 1 - East Approach

Site 1 - West Approach

SITE NO. 1

CANYON FERRY ROAD AT PRICKLY PEAR CREEK BRIDGE

A. DESCRIPTION

This site is located 1.14 miles west of the intersection of Canyon Ferry Road (FAS 430) and Wylie Drive. It is located on the north section line of Section 22, Range 3W, Township 10N.

Canyon Ferry Road is a major connector between Helena and the Canyon Ferry area. Low density residential development and farm land is located along the road. The road is used by commuters and in the summer it is a major access to the Canyon Ferry Lake recreation area.

The site is a 35-foot bridge over Prickly Pear Creek. The road curves on both sides of the bridge. The curves were ball-banked at 40 mph.

The 1988 average daily traffic is 2,805 vpd.

The existing site characteristics are shown on Figure 1-1.

B. ACCIDENT ANALYSIS

Thirteen accidents occurred at this site during the four-year period from 1984 through 1987. The following is a summary of characteristics of those accidents that have been used to determine possible accident causes:

- Eight (62 percent) of the accidents occurred on weekends.
- Nine (69 percent) of the accidents occurred when the road was dry.
- Eight (62 percent) of the accidents occurred during hours of dark or dusk.
- One (8 percent) of the accidents involved a collision with an animal.
- Five (38 percent) of the accidents involved single vehicles hitting the bridge guardrail.
- Twelve (92 percent) of the accidents involved single vehicles leaving the roadway or hitting the bridge.
- One (8 percent) of the accidents resulted in a fatality and five (38 percent) involved injuries.

* The investigating officer requested an engineering study to determine if an advisory speed should be posted.

* Four (31 percent) of the accidents involved alcohol.

* The investigating officers' analysis attributed the accidents to the following factors: speed too fast for conditions, careless driving, and alcohol.

Accident diagrams are shown in Figure 1-1. Table 1-1 summarizes accident characteristics at the site.

C. EVALUATION

The following factors pertaining to the site were determined from the field survey and accident analysis:

1. Five of the accidents involved westbound vehicles striking the north guardrail. Five of the vehicles hitting the north guardrail went off the south side of the road. One of these accidents involved a motorcycle and resulted in a fatality.

2. Since 62 percent of the accidents occurred during hours of dark or dusk, driver expectancy may be a problem during these hours.

3. Based on one investigating officer's request, 40 mph advisory speed plates have been added to the curve signs on both approaches. The curve was ball-banked at 40 mph during the field survey. These signs may have reduced accidents in 1987 when two of the thirteen accidents occurred.

D. RECOMMENDATIONS

The following improvements are recommended for this site.

1. Add reflector washers to guardrail on both sides of bridge spaced every 25 feet. The existing reflector washers are missing or reflectorization has deteriorated.

2. Install a (OM-3R, 12"x36") Type 3 Right Object Marker on the northeast bridge end.

3. Install five Design A delineators on the east approach to the bridge as shown in Figure 1-2.

E. COST

1.	Install reflector washers spaced at 25' on guardrail on each side of bridge, 40 @ $5 ea.	$200.00
2.	Install (OM-3R, 12"x36") Right Object Marker	100.00
3.	Install five 6' flexible delineators, Design A	100.00
	TOTAL COST	$400.00

F. HAZARD AND PRIORITY INDICES

Based on the information collected and the foregoing analysis, the hazard index for this location is determined to be 53.34. The priority index is 64.75. The calculations are shown in Table 1-2.

ACCIDENT SUMMARY

SITE NUMBER 1 ACCIDENT PERIOD 1984-1987

NUMBER OF ACCIDENTS BY YEAR

1984	1985	1986	1987
2	2	7	2

NUMBER OF ACCIDENTS BY DAY OF WEEK

Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
3	1	2			2	5

NUMBER OF ACCIDENTS BY MONTH

Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
4	1		1	2	1	1	1		1	1	

-- AM -- NUMBER OF ACCIDENTS BY TIME OF DAY -- PM --

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
	2					2	1			1			1			1				2	2	1	

NUMBER OF ACCIDENTS BY LIGHT CONDITIONS

Day-light	Dark	Dawn	Dusk
5	6		2

NUMBER OF ACCIDENTS BY ROAD CONDITIONS

Dry	Wet	Snow	Ice	Other
9			4	

NUMBER OF ACCIDENTS BY WEATHER CONDITIONS

Clear	Rain	Snow	Fog
4	9		

NUMBER OF ACCIDENTS BY ACCIDENT TYPE

Angle	Turn	Rear End	Fixed Object	Ped.	Animal	Side-swipe	Non-Col	Head-on	Backing
			9		2		2		

NUMBER OF ACCIDENTS BY POSSIBLE VIOLATION

No Violat.	Drinking	Reckless Driving	Speed	Right-of Way	Improper Passing	Improper Backing	Improper Turning	Other
3	4	1	5					

NUMBER OF ACCIDENTS BY SEVERITY

	1984	1985	1986	1987
Injury			4	1
Fatality				
Property Dam. Only	2	2	3	

NUMBER OF ACCIDENTS ALCOHOL INVOLVED

4

HAZARD INDEX CALCULATION

Site Number 1 Date 10/15/88

Site Description Canyon Ferry Road at Prickly Pear Creek Bridge

Indicator	Data Value		Indicator Value		Weight		Partial H.I.'s
Number of Accidents	3.25	acc/yr	50	X	0.164	=	8.20
Accident Rate	3.24	acc/MVE	50	X	0.225	=	11.25
Accident Severity	$10,108	dollars	64	X	0.191	=	12.22
Volume/Capacity Ratio	0.35		51	X	0.082	=	4.18
Sight Distance Ratio	1.0	(wt.ave.)	33	X	0.074	=	2.44
Driver Expectancy	3.5	(wt.ave.)	57	X	0.149	=	8.49
Information System Deficiencies	3.5	(wt.ave.)	57	X	0.115	=	6.56

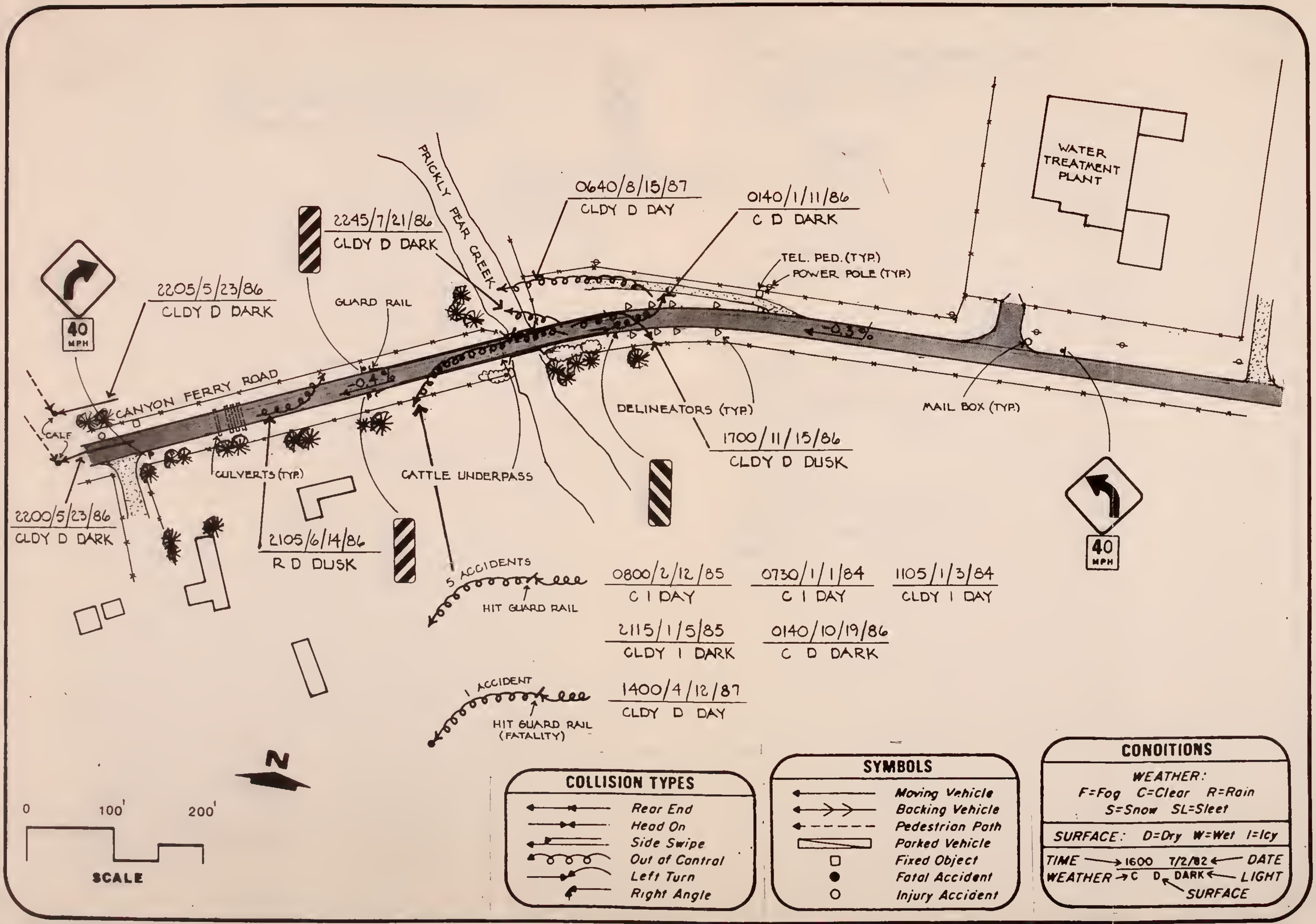
Hazard Index: 53.34

Cost of Recommended Improvements: $400.00

Cost Factor: 99

Priority Index = Hazard Index X .75 + Cost Factor X .25

53.34 X .75 + 99 X .25 = 64.75



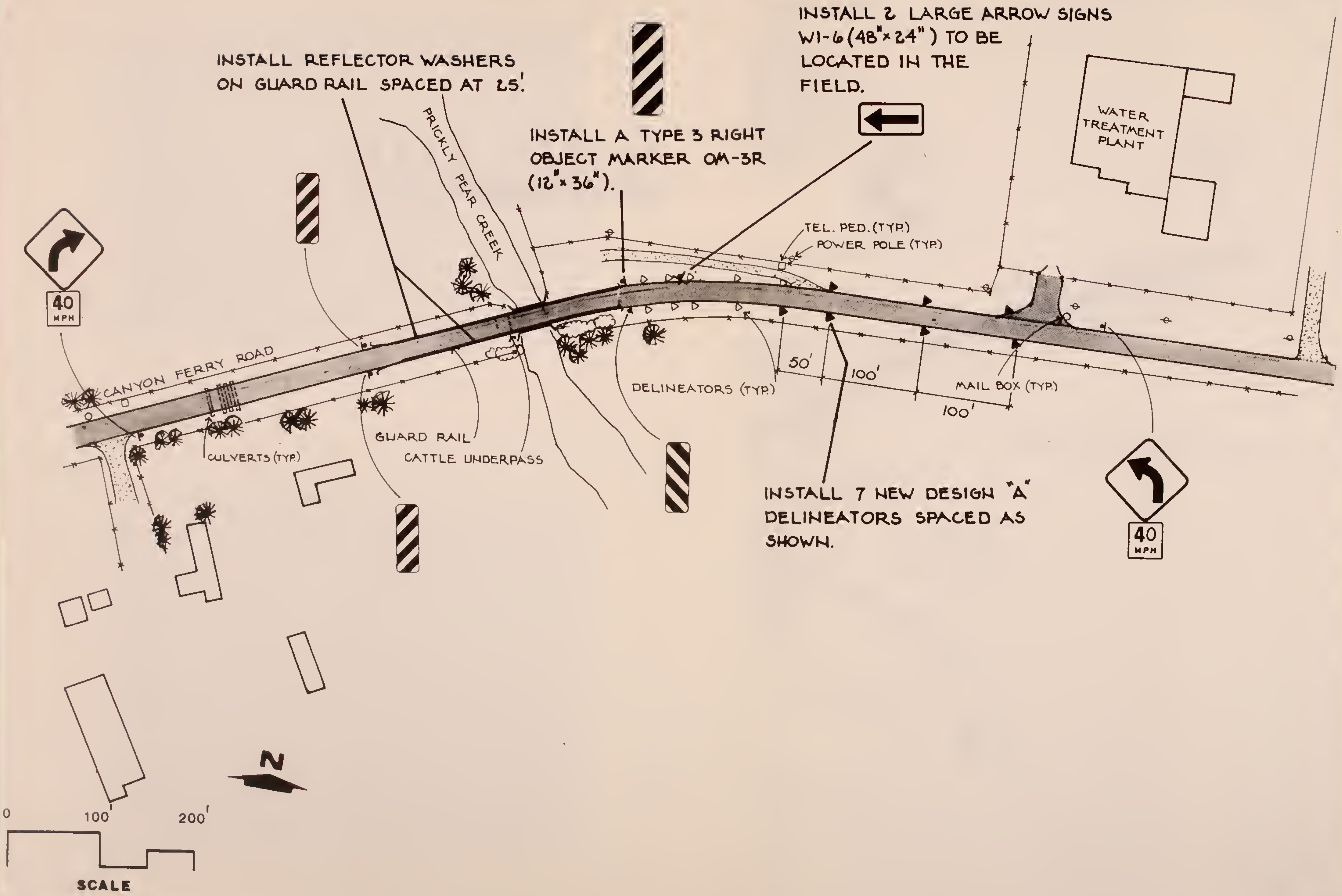
Existing Conditions & Accidents

Canyon Ferry Road & Prickley Pear Creek Bridge

SITE NO. 1

Lewis & Clark County

Fig. No.
1–1


INSTALL REFLECTOR WASHERS ON GUARD RAIL SPACED AT 25'.
INSTALL A TYPE 3 RIGHT OBJECT MARKER OM-3R (12"× 36").
INSTALL 2 LARGE ARROW SIGNS W1-6 (48"× 24") TO BE LOCATED IN THE FIELD.
WATER TREATMENT PLANT
PRICKLY PEAR CREEK
TEL. PED. (TYP.)
POWER POLE (TYP.)
40 MPH
CANYON FERRY ROAD
50'
100'
100'
DELINEATORS (TYP.)
MAIL BOX (TYP.)
GUARD RAIL
CATTLE UNDERPASS
CULVERTS (TYP.)
INSTALL 7 NEW DESIGN "A" DELINEATORS SPACED AS SHOWN.
40 MPH
N
0
100'
200'
SCALE

Recommended Improvements

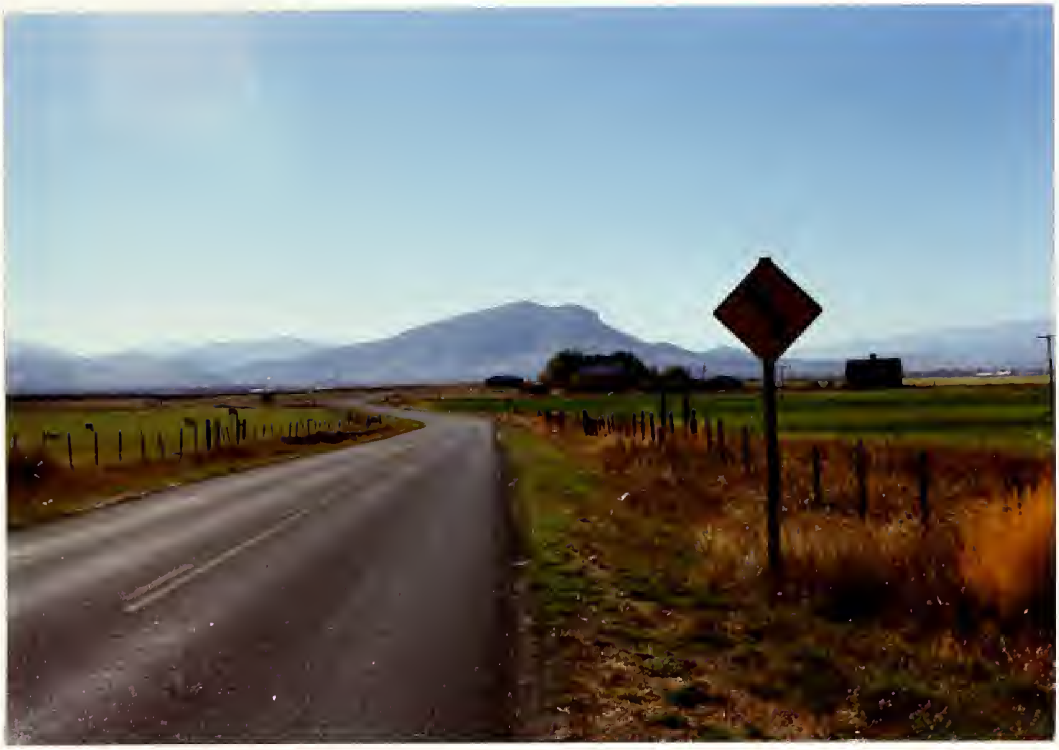
Canyon Ferry Road & Prickley Pear Creek Bridge

SITE NO. 1

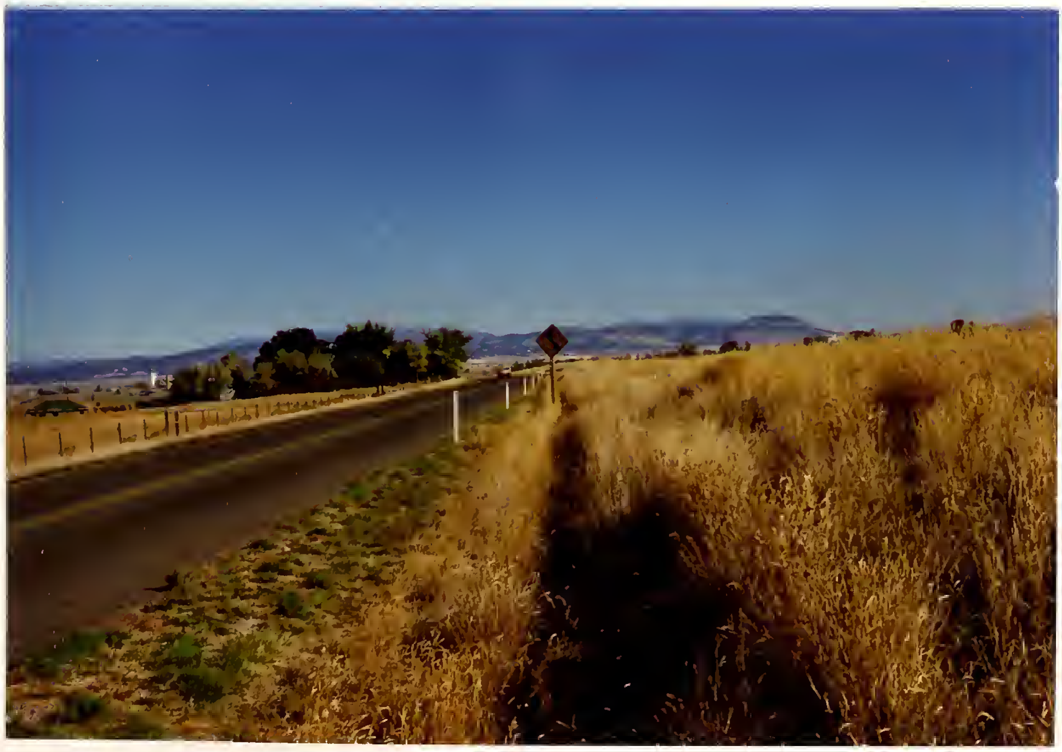
Lewis & Clark County

Fig. No.
1–2

SITE NO.2



Site 2 - East Approach



Site 2 - West Approach

SITE NO. 2

CANYON FERRY ROAD - REVERSE CURVE

A. DESCRIPTION

This site is located on Canyon Ferry Road approximately one mile east of the intersection of York Road (FAS 280) and Canyon Ferry Road (FAS 430). The site is located in Section 22, Range 3W, Township 10N. The site is a reverse curve.

Canyon Ferry Road is a major connector between Helena and the Canyon Ferry area. Low density residential development and farm land is located along the road. The road is used by commuters and in the summer it is a major access to the Canyon Ferry Lake recreation area.

The 1988 average daily traffic is 2,805 vpd.

The existing site characteristics are shown on Figure 2-1.

B. ACCIDENT ANALYSIS

Twelve accidents occurred at this site during the four-year period from 1984 through 1987. The following is a summary of characteristics that

are pertinent in determining factors that may have contributed to the accidents:

* Eleven (92 percent) occurred during weekdays.

* Eight (67 percent) of the accidents occurred during dark, dusk, or dawn hours.

* Road conditions were dry when eleven (85 percent) of the accidents occurred.

* Five (42 percent) of the accidents involved two vehicles meeting on the curve and either colliding or forcing one vehicle off the road.

* Eleven (92 percent) of the accidents, including a fatality, have occurred in the last three years of the study period.

* There were five injury accidents and one fatality at this site.

* Two of the accidents involved alcohol.

* The investigating officers' analysis attributed the accidents to the following factors: careless driving, alcohol, and speed too fast for conditions.

Accident diagrams are shown on Figure 2-1. Table 2-1 summarizes accident characteristics at the site.

C. EVALUATION

The following factors pertaining to the site were determined from the field survey and accident analysis:

1. Six of the accidents involved eastbound vehicles leaving the road.

2. Three of the accidents involved two vehicles colliding on the curve.

3. The curve ball-banked at 50 mph in both directions.

D. RECOMMENDATIONS

The following improvements are recommended for this site.

1. Add 50 mph W13-1, 18"x18 advisory speed plates to the reverse curve signs on the east and west approaches to the site.

2. Add a W1-6, 48"x24" Large Arrow sign on the west approach as shown in Figure 2-2. The final location should be determined in the field when the sign is installed.

3. Add six 6-foot flexible Design A delineators on the north side of the west approach as shown on Figure 2-2.

4. Add a W1-8, 18"x24" Chevron Alignment sign on the west approach as shown.

The recommended improvements are shown in Figure 2-2.

E. COST

1.	Install 50 mph W13-1, 18"x18" Advisory Speed Plate	$200.00
2.	Install W1-6, 48"x24" Large Arrow sign	140.00
3.	Install six 6' flexible Design A delinators	120.00
4.	Install W1-8, 18"x24" Chevron Alignment sign	100.00
TOTAL COST		$560.00

F. HAZARD AND PRIORITY INDICES

Based on the information collected and the foregoing analysis, the hazard index for this location is determined to be 47.85. The priority index is 60.64. The calculations are shown in Table 2-2.

ACCIDENT SUMMARY

SITE NUMBER 2 ACCIDENT PERIOD 1984-1987

NUMBER OF ACCIDENTS BY YEAR

1984	1985	1986	1987
1	5	4	2

NUMBER OF ACCIDENTS BY DAY OF WEEK

Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
	3	4		2	2	1

NUMBER OF ACCIDENTS BY MONTH

Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	1		2	1	1	2	2	1	1		1

NUMBER OF ACCIDENTS BY TIME OF DAY

-- AM -- -- PM --

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	1					1										2	3			1	1	1	1

NUMBER OF ACCIDENTS BY LIGHT CONDITIONS

Day-light	Dark	Dawn	Dusk
4	6	1	1

NUMBER OF ACCIDENTS BY ROAD CONDITIONS

Dry	Wet	Snow	Ice	Other
11			1	

NUMBER OF ACCIDENTS BY WEATHER CONDITIONS

Clear	Rain	Snow	Fog
8	3	1	

NUMBER OF ACCIDENTS BY ACCIDENT TYPE

Angle	Turn	Rear End	Fixed Object	Ped.	Animal	Side-swipe	Non-Col	Head-on	Backing
		1	7			1	2	1	

NUMBER OF ACCIDENTS BY POSSIBLE VIOLATION

No Violat.	Drinking	Reckless Driving	Speed	Right-of-Way	Improper Passing	Improper Backing	Improper Turning	Other
4	2	3	3					

NUMBER OF ACCIDENTS BY SEVERITY

	1984	1985	1986	1987
Injury	1		2	2
Fatality		1		
Property Dam. Only		4	2	

NUMBER OF ACCIDENTS ALCOHOL INVOLVED

2

HAZARD INDEX CALCULATION

Site Number 2 Date 10/15/88

Site Description Canyon Ferry Road - Curve

Indicator	Data Value	Indicator Value		Weight		Partial H.I.'s
Number of Accidents	3.00 acc/yr	48	X	0.164	=	7.87
Accident Rate	2.93 acc/MVE	44	X	0.225	=	9.90
Accident Severity	$12,567 dollars	69	X	0.191	=	13.18
Volume/Capacity Ratio	0.35	51	X	0.082	=	4.18
Sight Distance Ratio	1.0 (wt.ave.)	33	X	0.074	=	2.44
Driver Expectancy	1.5 (wt.ave.)	25	X	0.149	=	3.72
Information System Deficiencies	3.5 (wt.ave.)	57	X	0.115	=	6.56

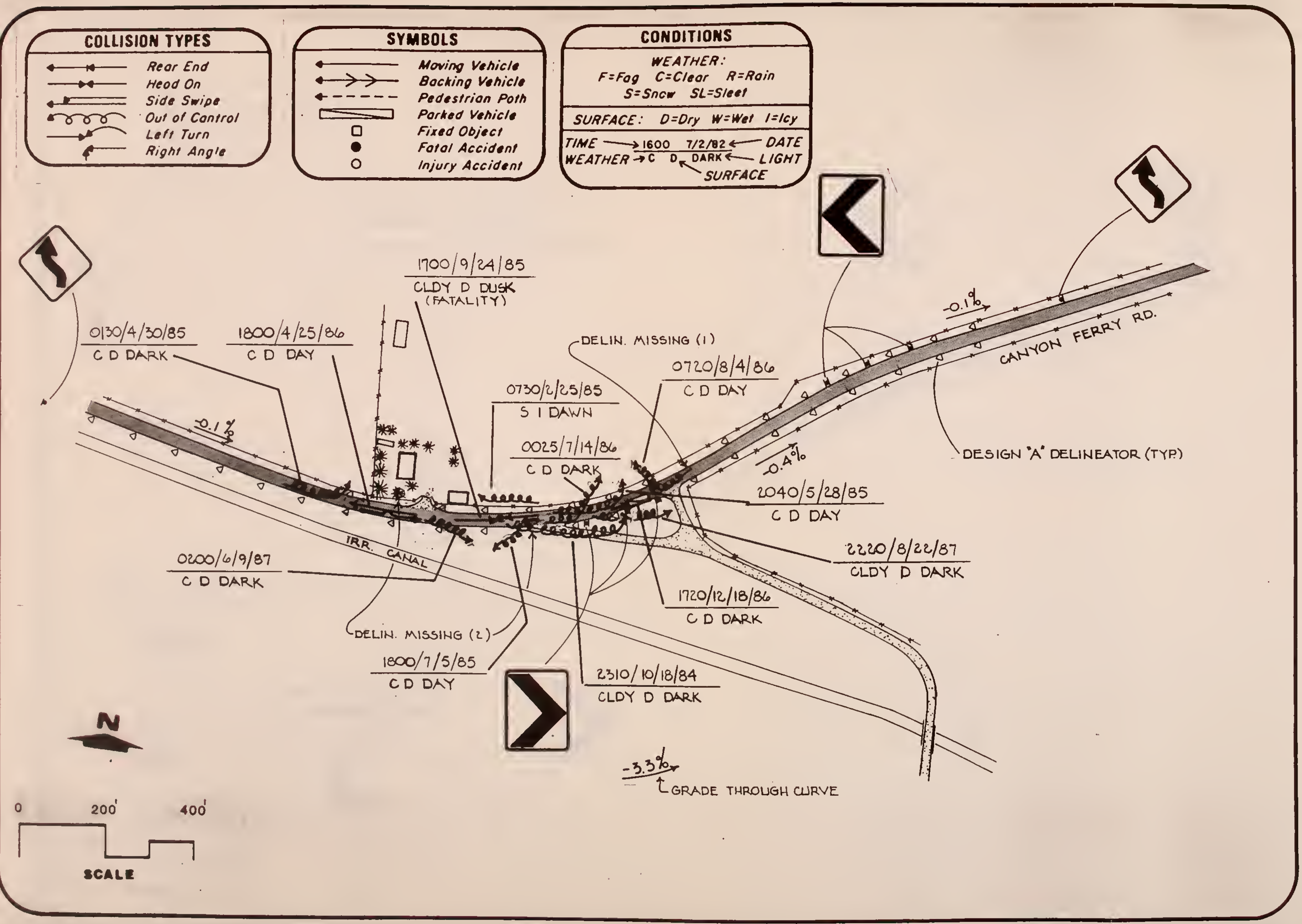
Hazard Index: 47.85

Cost of Recommended Improvements: $560.00

Cost Factor: 99

Priority Index = Hazard Index X .75 + Cost Factor X .25

47.85 X .75 + 99 X .25 = 60.64



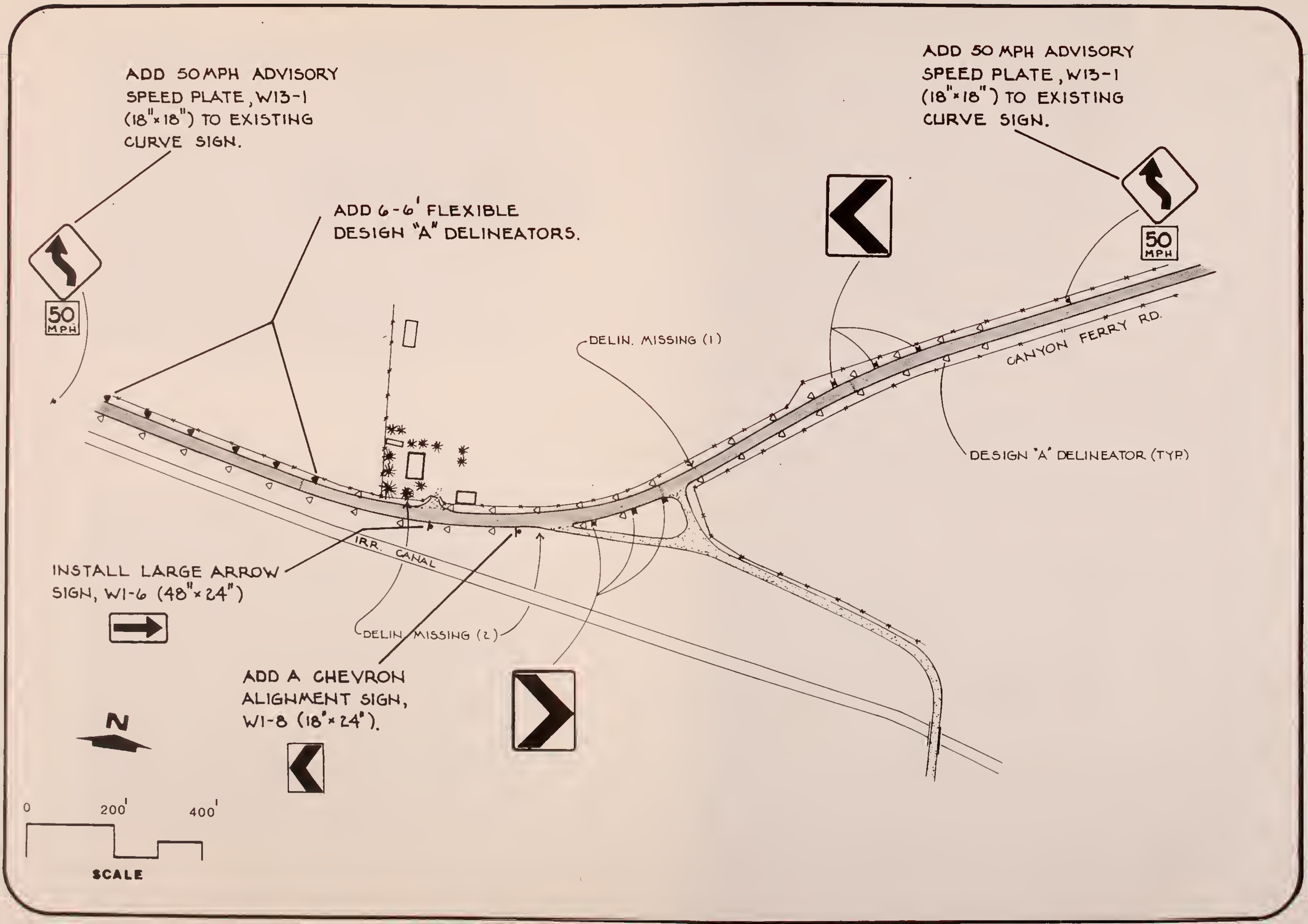
Existing Conditions & Accidents

Canyon Ferry Road -Curve

SITE NO. 2

Lewis & Clark County

Fig. No.
2-1


ADD 50MPH ADVISORY SPEED PLATE, W13-1 (18"×18") TO EXISTING CURVE SIGN.
50 MPH
ADD 6-6' FLEXIBLE DESIGN "A" DELINEATORS.
ADD 50 MPH ADVISORY SPEED PLATE, W13-1 (18"×18") TO EXISTING CURVE SIGN.
50 MPH
DELIN. MISSING (1)
CANYON FERRY RD.
DESIGN "A" DELINEATOR (TYP.)
IRR. CANAL
INSTALL LARGE ARROW SIGN, W1-6 (48"×24")
DELIN. MISSING (2)
ADD A CHEVRON ALIGNMENT SIGN, W1-8 (18"×24").
N
0
200'
400'
SCALE

Recommended Improvements

Canyon Ferry Road -Curve

SITE NO. 2

Lewis & Clark County

Fig. No.

2-2

SITE NO.3

Site 3 - East Approach

Site 3 - West Approach

Site 3 - South Approach

Site 3 - North Approach

SITE NO. 3

CANYON FERRY ROAD AND VALLEY DRIVE

A. DESCRIPTION

This site is located at the intersection of Canyon Ferry Road and Valley Drive, approximately 1.5 miles north of the East Helena city limits. The site is located at the intersection of Section 13, 18, 24, and 19, Range 3W, Township 10N. Canyon Ferry Road is paved and Valley Drive is paved from East Helena to approximately 1/2 mile north of Canyon Ferry Road. Canyon Ferry Road is the major road carrying traffic from Helena to the Canyon Ferry area. Valley Drive is a collector road serving low-density residential development along the road and providing a connector route from East Helena to York Road.

The intersection has STOP sign control on the north and south legs.

The 1988 average daily traffic is as follows:

Leg	ADT
North	525
South	1,208
East	2,180
West	2,300

The existing site characteristics are shown on Figure 3-1.

B. ACCIDENT ANALYSIS

Ten accidents occurred at this site during the four-year period from 1984 through 1987. The following is a summary of characteristics that are pertinent in determining factors that may have contributed to the accidents:

- Seven (70 percent) of the accidents have occurred in the last two years.

- Four (40 percent) of the accidents occurred on weekends.

- Nine (90 percent) of the accidents occurred during daylight hours.

- Nine (90 percent) of the accidents occurred when the road surface was dry.

- Three (30 percent) of the accidents were angle collisions and two (20 percent) involved turning vehicles.

- Eight (80 percent) of the accidents involved two or more vehicles.

- There was one fatal accident and three accidents involving injuries at this location.

- One (10 percent) of the accidents involved alcohol.

- The investigating officers' analysis attributed the accidents to the following driver-related factors: alcohol, speed too fast for conditions, improper turn, failure to yield right-of-way, and careless driving.

Accident diagrams are shown on Figure 3-1. Table 3-1 summarizes accident characteristics at the site.

C. EVALUATION

The following factors pertaining to the site were determined from the field survey and accident analysis:

1. The sight distance from the south approach looking east is limited by shrubs in the yard on the southeast corner. Three of the accidents involved northbound vehicles leaving the STOP sign on this approach and colliding with westbound vehicles.

2. Two of the accidents involved northbound vehicles running the STOP sign on the south approach.

D. RECOMMENDATIONS

The following improvements are recommended for this site.

1. Trim bushes in the southeast quadrant of the intersection to a height of three feet. These are on private property and would require owner's agreement.

2. Replace the existing R1-1, 30"x30" STOP sign on the north and south approaches with R1-1, 36"x36" STOP signs.

3. Install two W3-1a, 36"x36" STOP AHEAD signs 600 feet in advance of the STOP signs on the north and south approaches.

4. Install two W2-1, 30"x30" Cross Road signs 600 feet in advance of the intersection on the east and west approaches.

5. Install three Design D delineators on the north and south approaches as shown.

The recommended improvements are shown in Figure 3-2.

E. COST

1.	Trim bushes in southeast quadrant of intersection	$100.00
2.	Replace 30"x30" STOP signs with two R1-1, 36"x36"	280.00
3.	Install two W3-1a, 36"x36" STOP AHEAD signs	280.00
4.	Install two W2-1, 30"x30" Cross Road signs	280.00
5.	Install three Design D delineators	28.00
	TOTAL COST	$968.00

F. HAZARD AND PRIORITY INDICES

Based on the information collected and the foregoing analysis, the hazard index for this location is determined to be 47.31. The priority index is 60.23. The calculations are shown in Table 3-2.

ACCIDENT SUMMARY

SITE NUMBER 3

ACCIDENT PERIOD 1984-1987

NUMBER OF ACCIDENTS BY YEAR

1984	1985	1986	1987
1	2	4	3

NUMBER OF ACCIDENTS BY DAY OF WEEK

Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
1	1	2	1	1	1	3

NUMBER OF ACCIDENTS BY MONTH

Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
				1	1			2	4	1	1

-- AM -- NUMBER OF ACCIDENTS BY TIME OF DAY -- PM --

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
							2	1				1			2	3			1				

NUMBER OF ACCIDENTS BY LIGHT CONDITIONS

Day-light	Dark	Dawn	Dusk
9	1		

NUMBER OF ACCIDENTS BY ROAD CONDITIONS

Dry	Wet	Snow	Ice	Other
9			1	

NUMBER OF ACCIDENTS BY WEATHER CONDITIONS

Clear	Rain	Snow	Fog
8		1	1

NUMBER OF ACCIDENTS BY ACCIDENT TYPE

Angle	Turn	Rear End	Fixed Object	Ped.	Animal	Side-swipe	Non-Col	Head-on	Backing
4	2	2	2						

NUMBER OF ACCIDENTS BY POSSIBLE VIOLATION

No Violat.	Drinking	Reckless Driving	Speed	Right-of-Way	Improper Passing	Improper Backing	Improper Turning	Other
3	1	1	1	3			1	

NUMBER OF ACCIDENTS BY SEVERITY

	1984	1985	1986	1987
Injury	1	1	1	
Fatality				1
Property Dam. Only		1	3	2

NUMBER OF ACCIDENTS ALCOHOL INVOLVED

1

HAZARD INDEX CALCULATION

Site Number 3 Date 10/15/88

Site Description Canyon Ferry Road - Valley Drive

Indicator	Data Value		Indicator Value		Weight		Partial H.I.'s
Number of Accidents	2.50	acc/yr	44	X	0.164	=	7.22
Accident Rate	2.20	acc/MVE	36	X	0.225	=	8.10
Accident Severity	$12,340	dollars	67	X	0.191	=	12.80
Volume/Capacity Ratio	0.29		46	X	0.082	=	3.77
Sight Distance Ratio	1.67	(wt.ave.)	5	X	0.074	=	0.37
Driver Expectancy	3.5	(wt.ave.)	57	X	0.149	=	8.49
Information System Deficiencies	3.5	(wt.ave.)	57	X	0.115	=	6.56

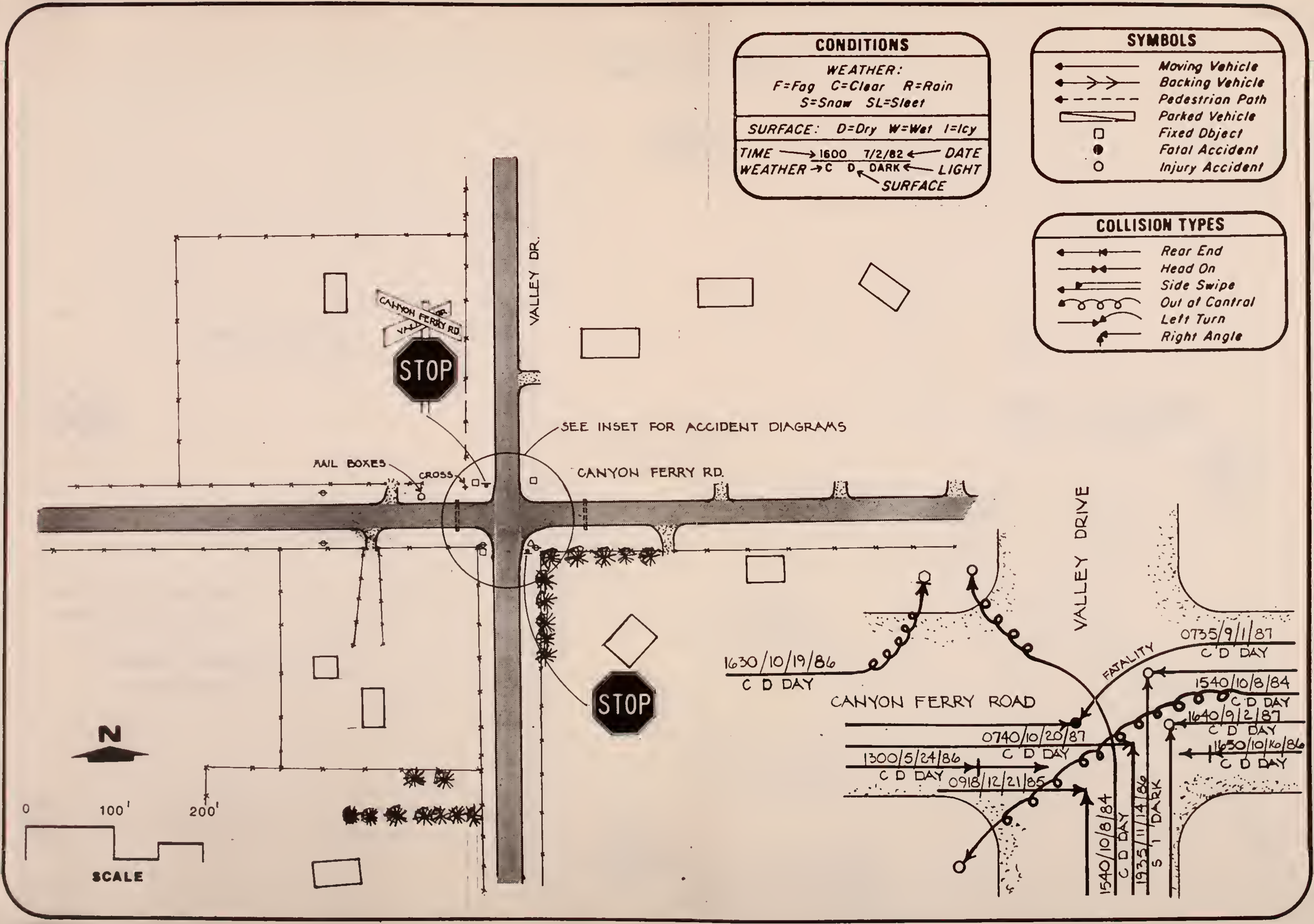
Hazard Index: 47.31

Cost of Recommended Improvements: $968.00

Cost Factor: 99

Priority Index = Hazard Index X .75 + Cost Factor X .25

47.31 X .75 + 99 X .25 = 60.23



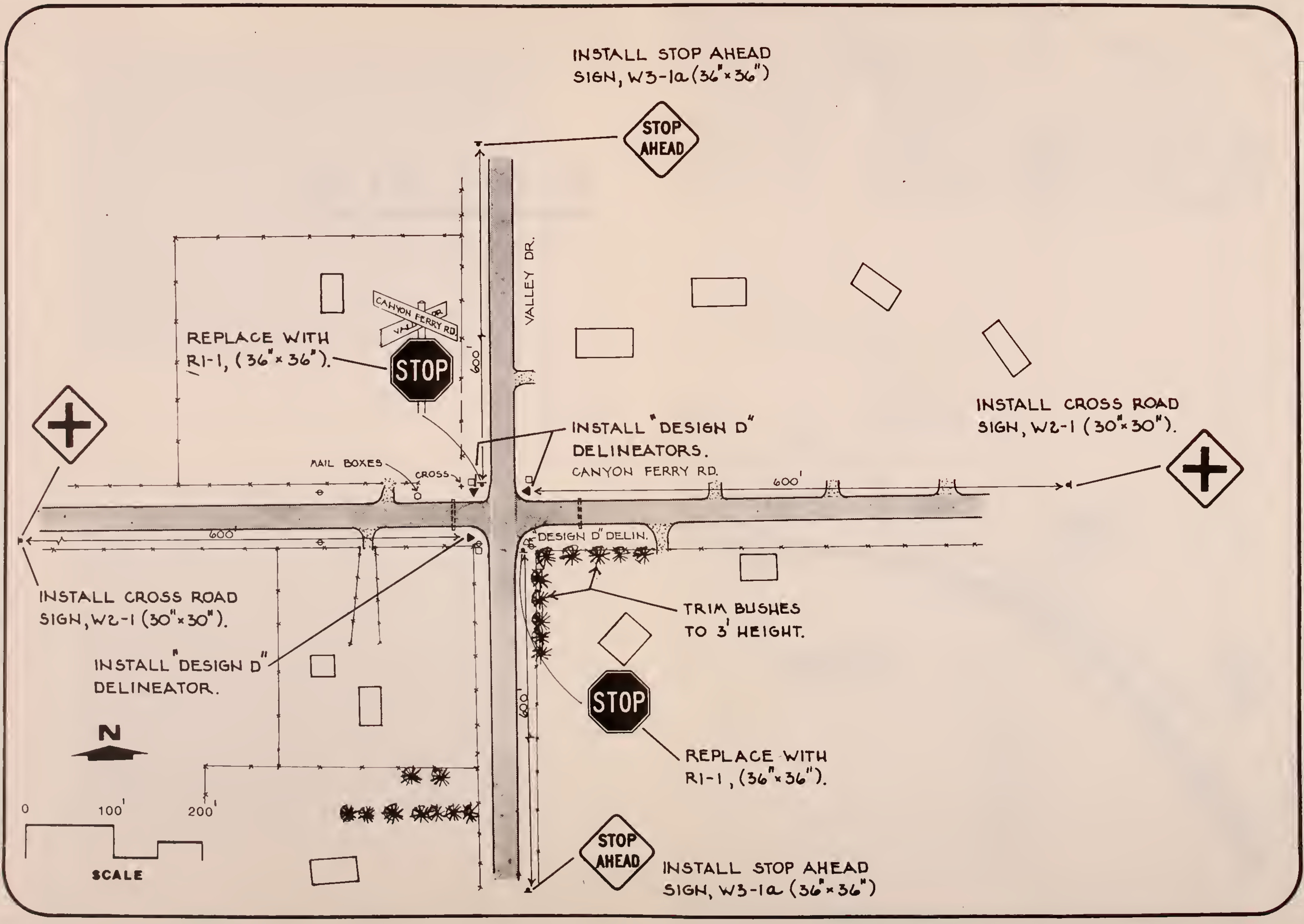
Existing Conditions & Accidents

Canyon Ferry Road-Valley Drive

SITE NO. 3

Lewis & Clark County

Fig. No.
3-1



Recommended Improvements

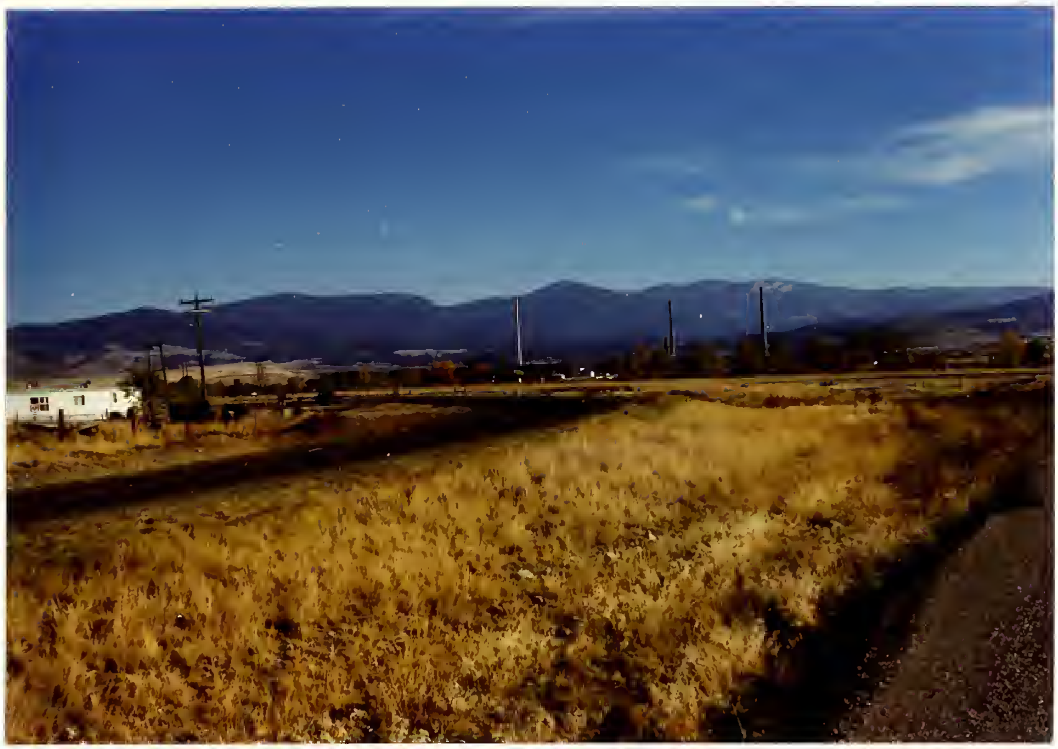
Canyon Ferry Road-Valley Drive

SITE NO. 3

Lewis & Clark County

Fig. No.
3-2

SITE NO.4



Site 4 - North Approach

Site 4 - South Approach

SITE NO. 4

WYLIE DRIVE - CURVE

A. DESCRIPTION

This site is located on Wylie Drive, approximately one mile north of East Helena. The site is located in Section 24, Range 3W, Township 10N.

Wylie Drive is a major connector between East Helena and the residential areas to the north. It connects to the Canyon Ferry Lake residential and recreation areas and to York Road, which serves the Lakeside and York residential and recreation areas.

The location consists of two curves separated by a 370-foot tangent. Four access roads serving the Mountain View Trailer Court connect to the road at points along the curves.

The 1988 average daily traffic is as follows:

North leg - 2,234 vpd

South leg - 2,517 vpd

The existing site characteristics are shown on Figure 4-1.

B. ACCIDENT ANALYSIS

Nine accidents occurred at this site during the four-year period from 1984 through 1987. The following is a summary of characteristics that are pertinent in determining factors that may have contributed to the accidents:

- Four (44 percent) of the accidents occurred on weekends.
- Five (67 percent) of the accidents occurred during daylight hours.
- Road conditions were dry when five (56 percent) of the accidents occurred.
- Six (67 percent) of the accidents involved two vehicles.
- Two (22 percent) of the accidents resulted in injuries.
- One accident involved alcohol.
- The investigating officers' analysis attributed the accidents to the following driver-related factors: alcohol, speed too fast for conditions, failure to yield right-of-way, and improper turn.

Accident diagrams are shown on Figure 4-1. Table 4-1 summarizes accident characteristics at the site.

C. EVALUATION

The following factors pertaining to the site were determined from the field survey and accident analysis:

1. Seven of the accidents involved vehicles entering or leaving the Mountain View Trailer Court.
2. Three of the accidents involved vehicles passing vehicles turning into the Mountain View Trailer Court.
3. The curves were ball banked at 50 mph in both directions. There are presently no advisory speed plates on the curve signs on the north and south approaches to the site.
4. An old, dilapidated farm house on the east side of the north curve obstructs sight distance on the curve.

D. RECOMMENDATIONS

The following improvements are recommended for this site.

1. Replace the existing reverse curve signs (W1-4L, 30"x30") on the north and south approaches to the site with two W1-2L, 30"x30" curve signs. The MUTCD specifies the use of reverse curve signs on curves where the tangent between curves is less than 600 feet. The tangent between curves at this site is 720 feet.

2. Add two W13-1, 18"x18" 50 MPH advisory speed plates to the curve signs on the north and south approaches.

3. Stripe for no passing for southbound traffic between the curve signs on the north and south approaches to the site. Install W14-3, 36"x48"x48" no passing zone signs on the north and south approaches to the site as shown on Figure 4-2. The conflicts between turning and passing vehicles require this improvement.

4. Install six roadway approach delineators, Design D, at the approaches to Mountain View Mobile Home Court.

5. Install one W1-6, 48"x24" large arrow on the north curve as shown.

6. Install three W1-8, 12"x18" double chevron alignment signs on the north curve and three on the south curve as shown.

The recommended improvements are shown in Figure 4-2.

E. COST

1.	Install two W1-2L, 30"x30" left curve signs	$280.00
2.	Install two W13-1, 18"x18" advisory speed plates	200.00
3.	Install two W14-3, 36"x48"x48" No Passing Zone signs	200.00
4.	Install six Roadway Approach Design D delineators	56.00
5.	Install one W1-6, 48"x24" Large Arrow sign	140.00
6.	Install five W1-8, 12"x18" Double Chevron Alignment signs	500.00
TOTAL COST		$1,376.00

F. HAZARD AND PRIORITY INDICES

Based on the information collected and the foregoing analysis, the hazard index for this location is determined to be 52.56. The priority index is 64.17. The calculations are shown in Table 4-2.

ACCIDENT SUMMARY

SITE NUMBER 4

ACCIDENT PERIOD 1984-1987

NUMBER OF ACCIDENTS BY YEAR

1984	1985	1986	1987
3	3	1	2

NUMBER OF ACCIDENTS BY DAY OF WEEK

Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
1		1	2		2	3

NUMBER OF ACCIDENTS BY MONTH

Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	2	1	1			2	1				1

-- AM -- NUMBER OF ACCIDENTS BY TIME OF DAY -- PM --

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
	1						1	2	1						1			1	1	1			

NUMBER OF ACCIDENTS BY LIGHT CONDITIONS

Day-light	Dark	Dawn	Dusk
6	2		1

NUMBER OF ACCIDENTS BY ROAD CONDITIONS

Dry	Wet	Snow	Ice	Other
5	2	1	1	

NUMBER OF ACCIDENTS BY WEATHER CONDITIONS

Clear	Rain	Snow	Fog
4	4	1	

NUMBER OF ACCIDENTS BY ACCIDENT TYPE

Angle	Turn	Rear End	Fixed Object	Ped.	Animal	Side-swipe	Non-Col	Head-on	Backing
2	3		3			1			

NUMBER OF ACCIDENTS BY POSSIBLE VIOLATION

No Violat.	Drinking	Reckless Driving	Speed	Right-of-Way	Improper Passing	Improper Backing	Improper Turning	Other
4	1		2	1			1	

NUMBER OF ACCIDENTS BY SEVERITY

	1984	1985	1986	1987
Injury			1	1
Fatality				
Property Dam. Only	3	3		1

NUMBER OF ACCIDENTS ALCOHOL INVOLVED

1

HAZARD INDEX CALCULATION

Site Number 4 Date 10/15/88

Site Description Wylie Drive - Curves

Indicator	Data Value		Indicator Value		Weight		Partial H.I.'s
Number of Accidents	2.25	acc/yr	38	X	0.164	=	6.23
Accident Rate	2.60	acc/MVE	43	X	0.225	=	9.68
Accident Severity	$11,211	dollars	65	X	0.191	=	12.42
Volume/Capacity Ratio	0.31		47	X	0.082	=	3.85
Sight Distance Ratio	0.67	(wt.ave.)	72	X	0.074	=	5.33
Driver Expectancy	3.5	(wt.ave.)	57	X	0.149	=	8.49
Information System Deficiencies	3.5	(wt.ave.)	57	X	0.115	=	6.56

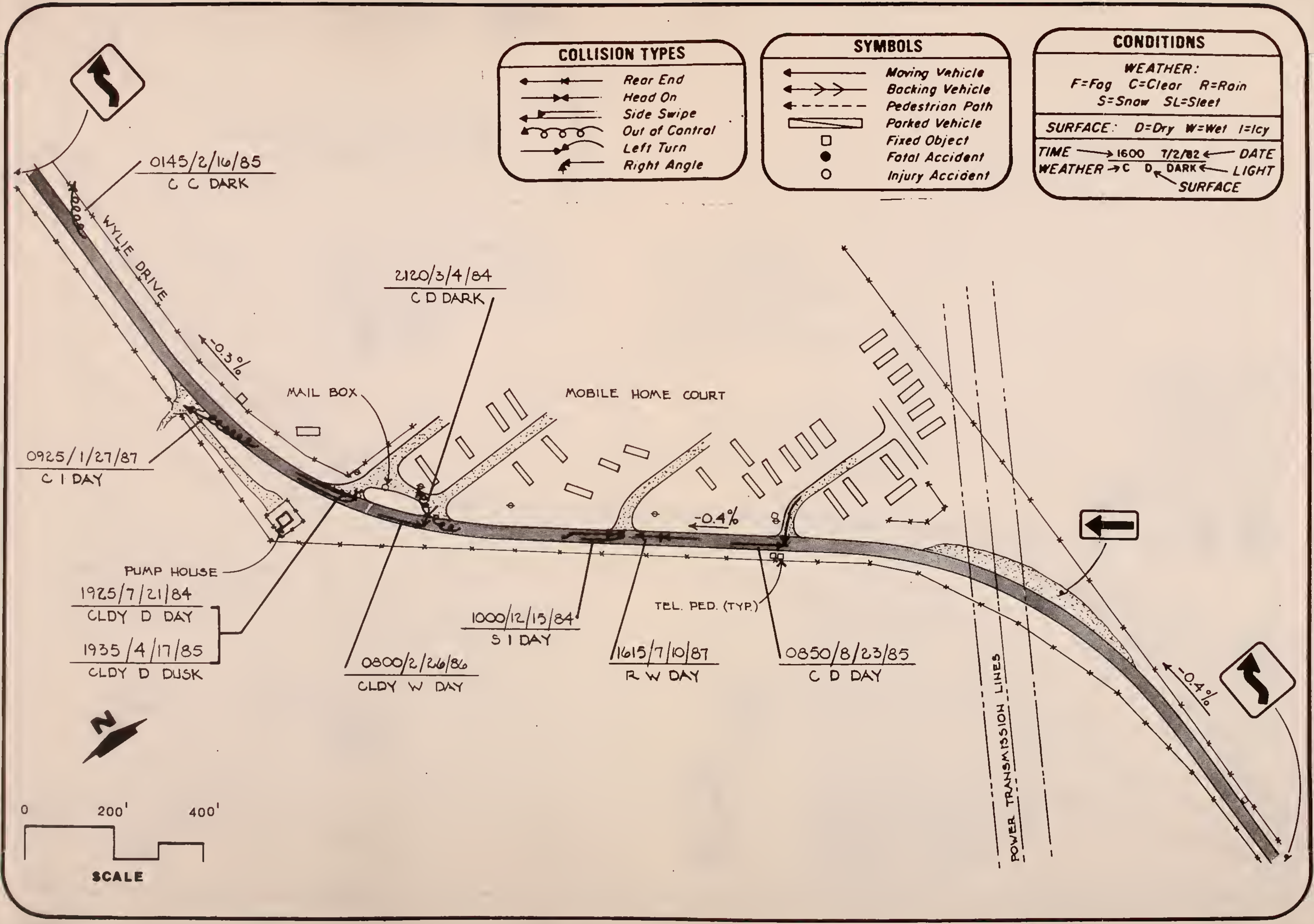
Hazard Index: 52.56

Cost of Recommended Improvements: $1,376.00

Cost Factor: 99

Priority Index = Hazard Index X .75 + Cost Factor X .25

52.56 X .75 + 99 X .25 = 64.17



SITE NO. 4

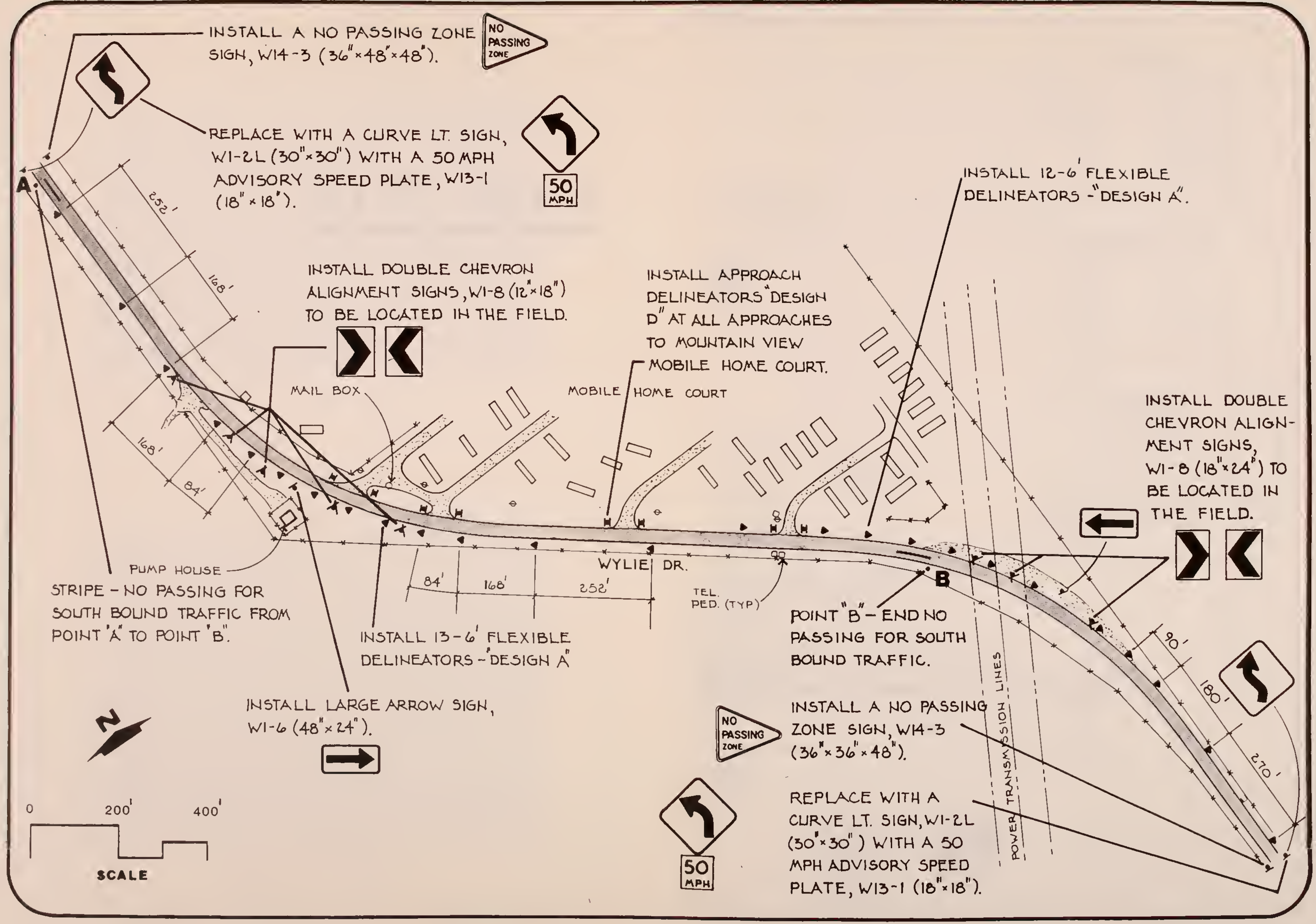
Lewis & Clark County

Existing Conditions & Accidents

Wylie Drive-Curve

Fig. No.

4-1


INSTALL A NO PASSING ZONE SIGN, W14-3 (36"×48"×48").
NO PASSING ZONE
REPLACE WITH A CURVE LT. SIGN, W1-2L (30"×30") WITH A 50 MPH ADVISORY SPEED PLATE, W13-1 (18"×18").
50 MPH
A
252'
168'
168'
84'
INSTALL DOUBLE CHEVRON ALIGNMENT SIGNS, W1-8 (12"×18") TO BE LOCATED IN THE FIELD.
MAIL BOX
INSTALL APPROACH DELINEATORS "DESIGN D" AT ALL APPROACHES TO MOUNTAIN VIEW MOBILE HOME COURT.
MOBILE HOME COURT
INSTALL 12-6' FLEXIBLE DELINEATORS -"DESIGN A".
INSTALL DOUBLE CHEVRON ALIGNMENT SIGNS, W1-8 (18"×24") TO BE LOCATED IN THE FIELD.
PUMP HOUSE
STRIPE - NO PASSING FOR SOUTH BOUND TRAFFIC FROM POINT 'A' TO POINT 'B'.
WYLIE DR.
84'
168'
252'
TEL. PED. (TYP)
B
POINT "B" - END NO PASSING FOR SOUTH BOUND TRAFFIC.
INSTALL 13-6' FLEXIBLE DELINEATORS -"DESIGN A"
90'
180'
270'
INSTALL LARGE ARROW SIGN, W1-6 (48"×24").
NO PASSING ZONE
INSTALL A NO PASSING ZONE SIGN, W14-3 (36"×36"×48").
POWER TRANSMISSION LINES
REPLACE WITH A CURVE LT. SIGN, W1-2L (30"×30") WITH A 50 MPH ADVISORY SPEED PLATE, W13-1 (18"×18").
50 MPH
N
0
200'
400'
SCALE

Recommended Improvements

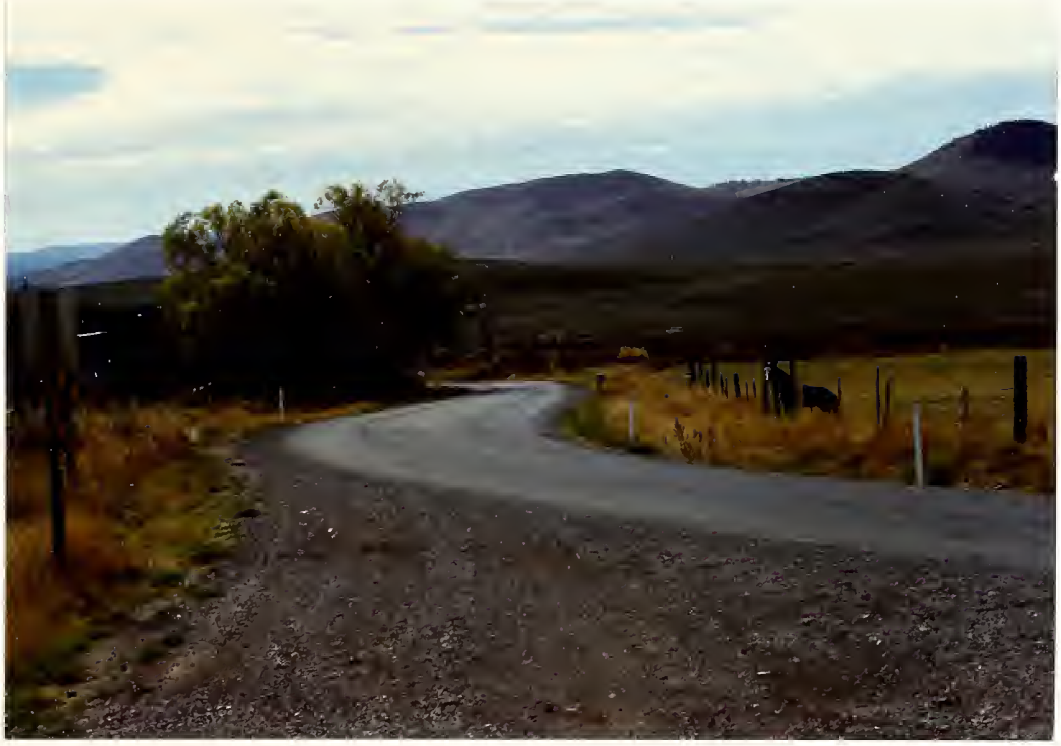
Wylie Drive-Curve

SITE NO. 4

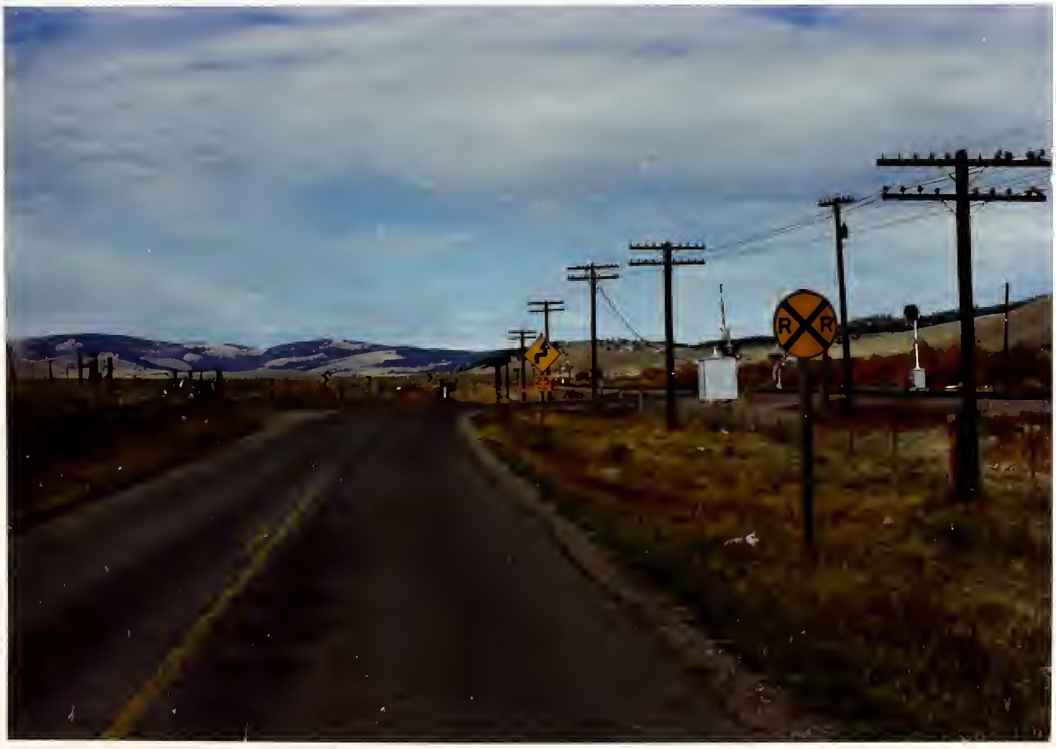
Lewis & Clark County

Fig. No.
4-2

SITE NO.5



Site 5 - North Approach



Site 5 - South Approach

SITE NO. 5

BIRDSEYE ROAD AND BURLINGTON NORTHERN RAILROAD TRACKS

A. DESCRIPTION

This site is located approximately three miles northwest of Helena in Section 4, Range 4W, Township 10N. Birdseye Road serves the residential areas between west Helena and Lincoln Road. Most of the residents living in this area commute to Helena for work and services. The railroad crossing is located on a curve at the base of a steep hill.

The estimated 1988 average daily traffic is 1,122 vpd.

The existing site characteristics are shown on Figure 5-1.

B. ACCIDENT ANALYSIS

Seven accidents occurred at this site during the four-year period from 1984 through 1987. The following is a summary of characteristics that are pertinent in determining factors that may have contributed to the accidents:

* Five (71 percent) of the accidents occurred on weekends.

- Four (57 percent) of the accidents occurred during daylight hours.

- The road conditions were snowpacked or icy when five (71 percent) of the accidents occurred.

- Three (43 percent) of the accidents involved a collision between two vehicles.

- Six (86 percent) of the accidents have occurred in the past two years.

- The investigating officers' analysis attributed the accidents to the following driver-related factors: careless driving, and speed too fast for conditions.

Accident diagrams are shown on Figure 5-1. Table 5-1 summarizes accident characteristics at the site.

C. EVALUATION

The following factors pertaining to the site were determined from the field survey and accident analysis:

1. The curve was ball-banked at 20 mph. The existing advisory speed plates are 25 mph.

2. Four of the accidents involved southbound traffic coming off the hill into the curves.

3. The site is heavily signed with large arrows and chevrons.

D. RECOMMENDATIONS

The following improvements are recommended for this site.

1. Replace the 25 MPH advisory speed plates on the north and south approaches to the site with 20 MPH W13-1, 18"x18" advisory speed plates.

2. Add 29 six-foot flexible Design A delineators on the curves and between curves as shown.

The recommended improvements are shown in Figure 5-2.

E. COST

1. Install two W13-1, 18"x18" 20 MPH advisory $200.00

	speed plates.	
2.	Install 29 6' flexible Design A delineators	580.00
TOTAL COST		$780.00

F. HAZARD AND PRIORITY INDICES

Based on the information collected and the foregoing analysis, the hazard index for this location is determined to be 58.88. The priority index is 68.91. The calculations are shown in Table 5-2.

ACCIDENT SUMMARY

SITE NUMBER 5 ACCIDENT PERIOD 1984-1987

NUMBER OF ACCIDENTS BY YEAR

1984	1985	1986	1987
	1	5	1

NUMBER OF ACCIDENTS BY DAY OF WEEK

Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
3		1		1		2

NUMBER OF ACCIDENTS BY MONTH

Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	1				1				1	3	

NUMBER OF ACCIDENTS BY TIME OF DAY

-- AM -- -- PM --

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
					1				1						1	1			2	1			

NUMBER OF ACCIDENTS BY LIGHT CONDITIONS

Day-light	Dark	Dawn	Dusk
4	3		

NUMBER OF ACCIDENTS BY ROAD CONDITIONS

Dry	Wet	Snow	Ice	Other
2		1	4	

NUMBER OF ACCIDENTS BY WEATHER CONDITIONS

Clear	Rain	Snow	Fog
2	4	1	

NUMBER OF ACCIDENTS BY ACCIDENT TYPE

Angle	Turn	Rear End	Fixed Object	Ped.	Animal	Side-swipe	Non-Col	Head-on	Backing
1			3			2	1		

NUMBER OF ACCIDENTS BY POSSIBLE VIOLATION

No Violat.	Drinking	Reckless Driving	Speed	Right-of-Way	Improper Passing	Improper Backing	Improper Turning	Other
4		1	2					

NUMBER OF ACCIDENTS BY SEVERITY

	1984	1985	1986	1987
Injury			1	
Fatality				
Property Dam. Only		1	4	1

NUMBER OF ACCIDENTS ALCOHOL INVOLVED

0

HAZARD INDEX CALCULATION

Site Number 5 Date 10/15/88

Site Description Birdseye Road - B.N. Railroad Crossing

Indicator	Data Value		Indicator Value		Weight		Partial H.I.'s
Number of Accidents	1.75	acc/yr	36	X	0.164	=	5.90
Accident Rate	4.27	acc/MVE	59	X	0.225	=	13.28
Accident Severity	$12,686	dollars	71	X	0.191	=	13.56
Volume/Capacity Ratio	0.28		45	X	0.082	=	3.69
Sight Distance Ratio	<.5	(wt.ave.)	100	X	0.074	=	7.40
Driver Expectancy	3.5	(wt.ave.)	57	X	0.149	=	8,49
Information System Deficiencies	3.5	(wt.ave.)	57	X	0.115	=	6.56

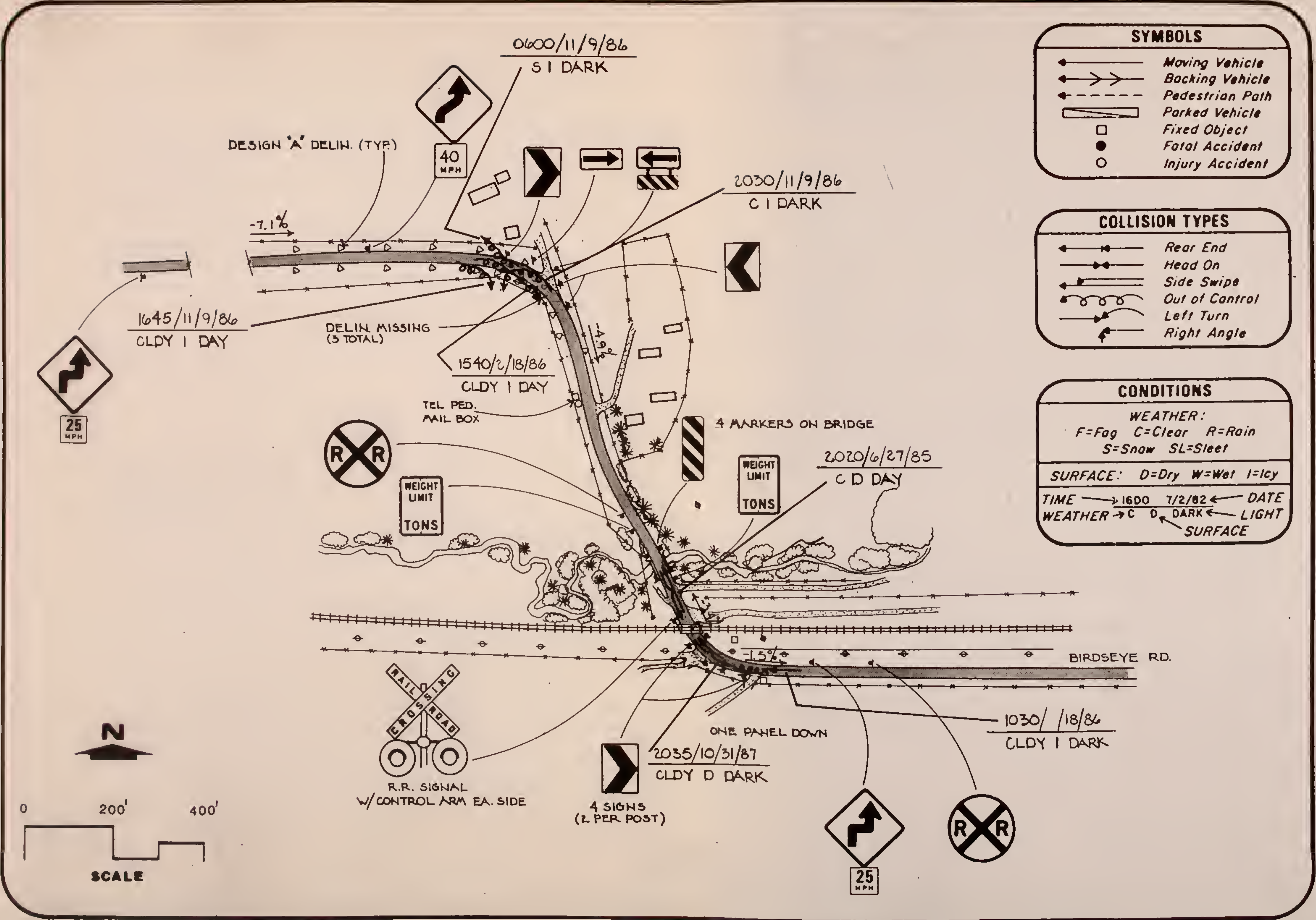
Hazard Index: 58.88

Cost of Recommended Improvements: $780.00

Cost Factor: 99

Priority Index = Hazard Index X .75 + Cost Factor X .25

58.88 X .75 + 99 X .25 = 68.91



Existing Conditions & Accidents

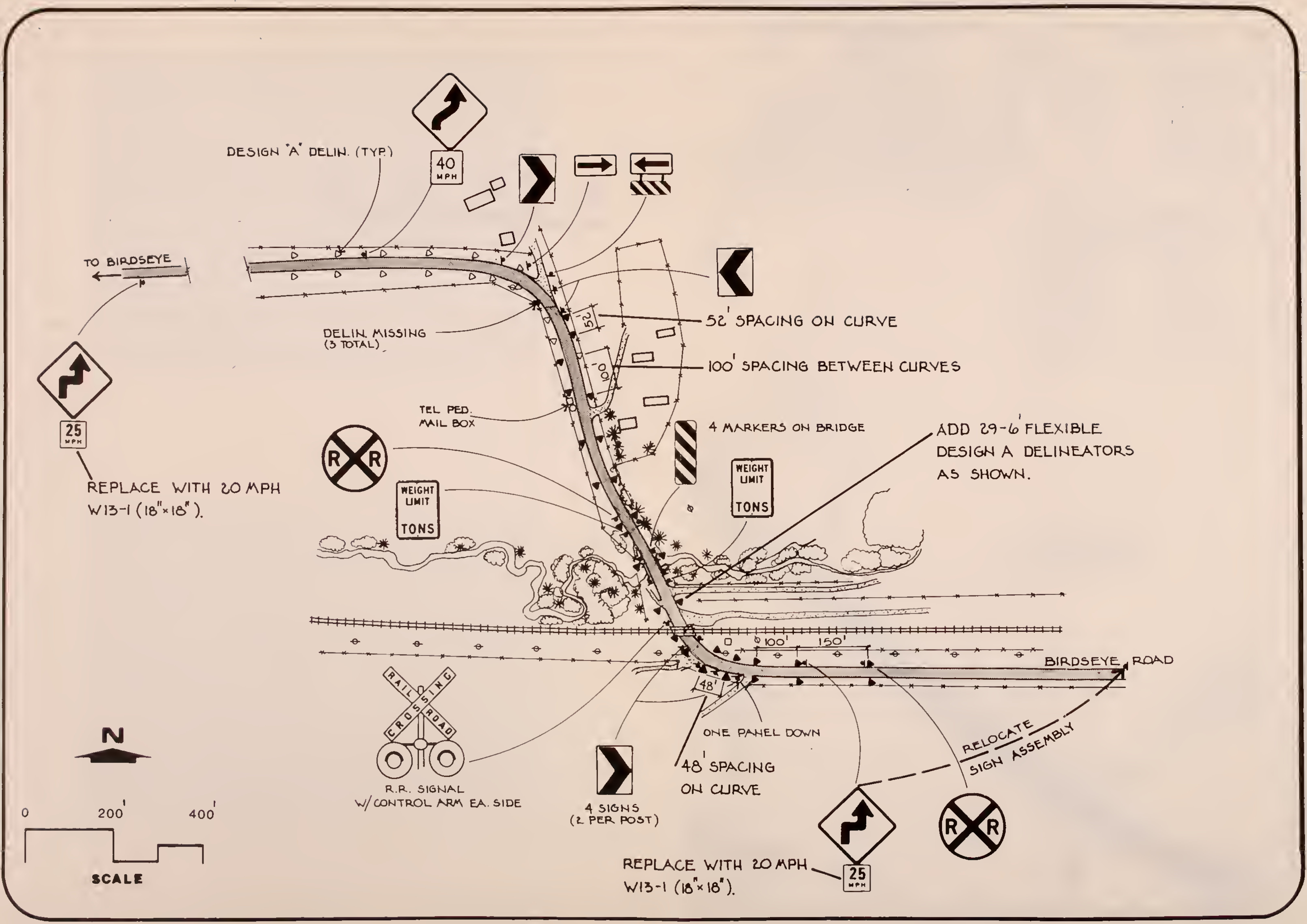
Birdseye Road-R.R. Crossing

SITE NO. 5

Lewis & Clark County

Fig. No.

5-1



Recommended Improvements

Birdseye Road–R.R. Crossing

SITE NO. 5

Lewis & Clark County

Fig. No. 5-2

SITE NO.6

Site 6 - North Approach

Site 6 - South Approach

SITE NO. 6

BIRDSEYE CREEK ROAD - CURVE

A. DESCRIPTION

This site is located on Birdseye Creek Road approximately 0.9 mile south of Lincoln Road (FAS 279). The location is a curve where the road dips into a gully adjacent to a farmstead. The site is located in Section 1, Range 5W, Township 11N.

The 1988 average daily traffic at the crossing is estimated to be 165 vpd.

The existing site characteristics are shown on Figure 6-1.

B. ACCIDENT ANALYSIS

Seven accidents occurred at this site during the four-year period from 1984 through 1987. The following is a summary of characteristics that are pertinent in determining factors that may have contributed to the accidents:

* Six (86 percent) of the accidents occurred on weekdays.

* Four (57 percent) of the accidents occurred during hours of darkness.

* Five (71 percent) of the accidents occurred on a dry road.

* Six (86 percent) of the accidents involved single vehicles leaving the roadway.

* Five (71 percent) of the accidents occurred in the past two years.

* Five (71 percent) of the accidents resulted in property damage only.

* Alcohol was involved in one (14 percent) of the accidents.

* The investigating officers' analysis attributed the accidents to the following factors: speed too fast for conditions, careless driving, and alcohol.

Accident diagrams are shown on Figure 6-1. Table 6-1 summarizes accident characteristics at the site.

C. EVALUATION

The following factors pertaining to the site were determined from the field survey and accident analysis:

1. Six of the accidents involved vehicles failing to negotiate the south curve.

2. The curves were ball-banked at 25 mph, which requires Reverse Turn signs instead of the existing Reverse Curve signs.

D. RECOMMENDATIONS

The following improvements are recommended for this site.

1. Replace the existing W1-4R, 30"x30" Right Curve signs on the north and south approaches with W1-3R, 30"x30" Right Turn signs.

2. Install two W1-6, 48"x24" large arrow signs on the south curve to be located in the field at time of installation.

3. Install 8 6-foot flexible Design A delineators on the south curve.

4. Install two Design D approach delineators on the driveway approach located near the middle of the south curve.

The recommended improvements are shown in Figure 6-2.

E. COST

1.	Install two W1-3R, 30"x30" Right Turn signs	$280.00
2.	Install two W1-6, 48"x24" Large Arrow signs	280.00
3.	Install eight 6-ft. flexible Design A delineators	160.00
4.	Install two Design D approach delineators	20.00
	TOTAL COST	$740.00

F. HAZARD AND PRIORITY INDICES

Based on the information collected and the foregoing analysis, the hazard index for this location is determined to be 68.41. The priority index is 76.06. The calculations are shown in Table 6-2.

ACCIDENT SUMMARY

SITE NUMBER 6 ACCIDENT PERIOD 1984-1987

NUMBER OF ACCIDENTS BY YEAR

1984	1985	1986	1987
	2	1	4

NUMBER OF ACCIDENTS BY DAY OF WEEK

Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
	1	2		1	2	1

NUMBER OF ACCIDENTS BY MONTH

Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
2		1		2			1				1

-- AM -- NUMBER OF ACCIDENTS BY TIME OF DAY -- PM --

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
						1		1									1				3	1	

NUMBER OF ACCIDENTS BY LIGHT CONDITIONS

Day-light	Dark	Dawn	Dusk
3	4		

NUMBER OF ACCIDENTS BY ROAD CONDITIONS

Dry	Wet	Snow	Ice	Other
5		1	1	

NUMBER OF ACCIDENTS BY WEATHER CONDITIONS

Clear	Rain	Snow	Fog
4	3		

NUMBER OF ACCIDENTS BY ACCIDENT TYPE

Angle	Turn	Rear End	Fixed Object	Ped.	Animal	Side-swipe	Non-Col	Head-on	Backing
	1		4				2		

NUMBER OF ACCIDENTS BY POSSIBLE VIOLATION

No Violat.	Drinking	Reckless Driving	Speed	Right-of-Way	Improper Passing	Improper Backing	Improper Turning	Other
3	1	1	2					

NUMBER OF ACCIDENTS BY SEVERITY

	1984	1985	1986	1987
Injury		1		1
Fatality				
Property Dam. Only		1	1	3

NUMBER OF ACCIDENTS ALCOHOL INVOLVED

1

HAZARD INDEX CALCULATION

Site Number 6 Date 10/15/88

Site Description Birdseye Road - Reverse Curves

Indicator	Data Value		Indicator Value		Weight		Partial H.I.'s
Number of Accidents	1.75	acc/yr	37	X	0.164	=	6.07
Accident Rate	29.96	acc/MVE	100	X	0.225	=	22.50
Accident Severity	$12,830	dollars	70	X	0.191	=	13.37
Volume/Capacity Ratio	.04		17	X	0.082	=	1.39
Sight Distance Ratio	< .5	(wt.ave.)	100	X	0.074	=	7.40
Driver Expectancy	4.0	(wt.ave.)	67	X	0.149	=	9.98
Information System Deficiencies	4.0	(wt.ave.)	67	X	0.115	=	7.70

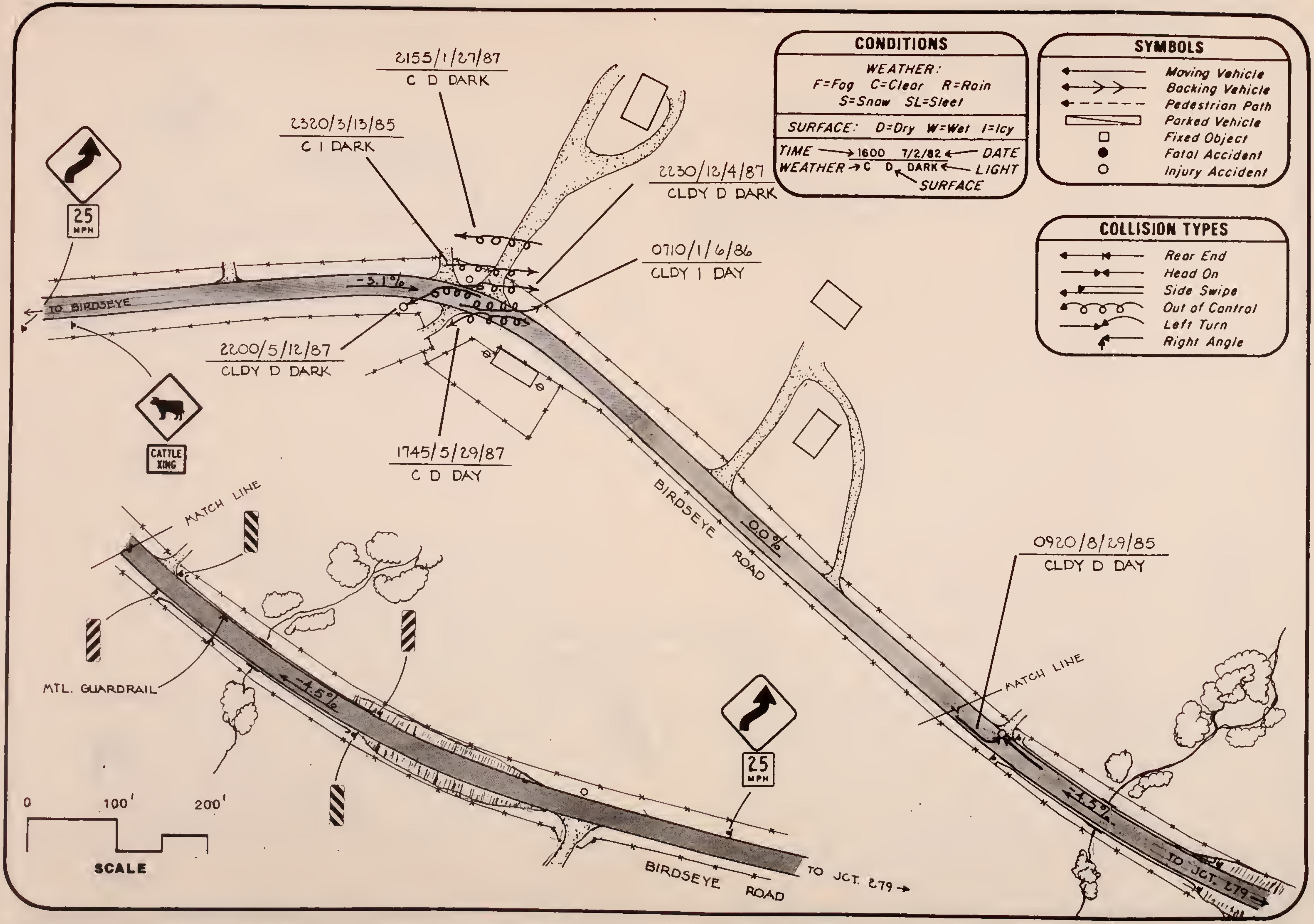
Hazard Index: 68.41

Cost of Recommended Improvements: $740.00

Cost Factor: 99

Priority Index = Hazard Index X .75 + Cost Factor X .25

68.41 X .75 + 99 X .25 = 76.06



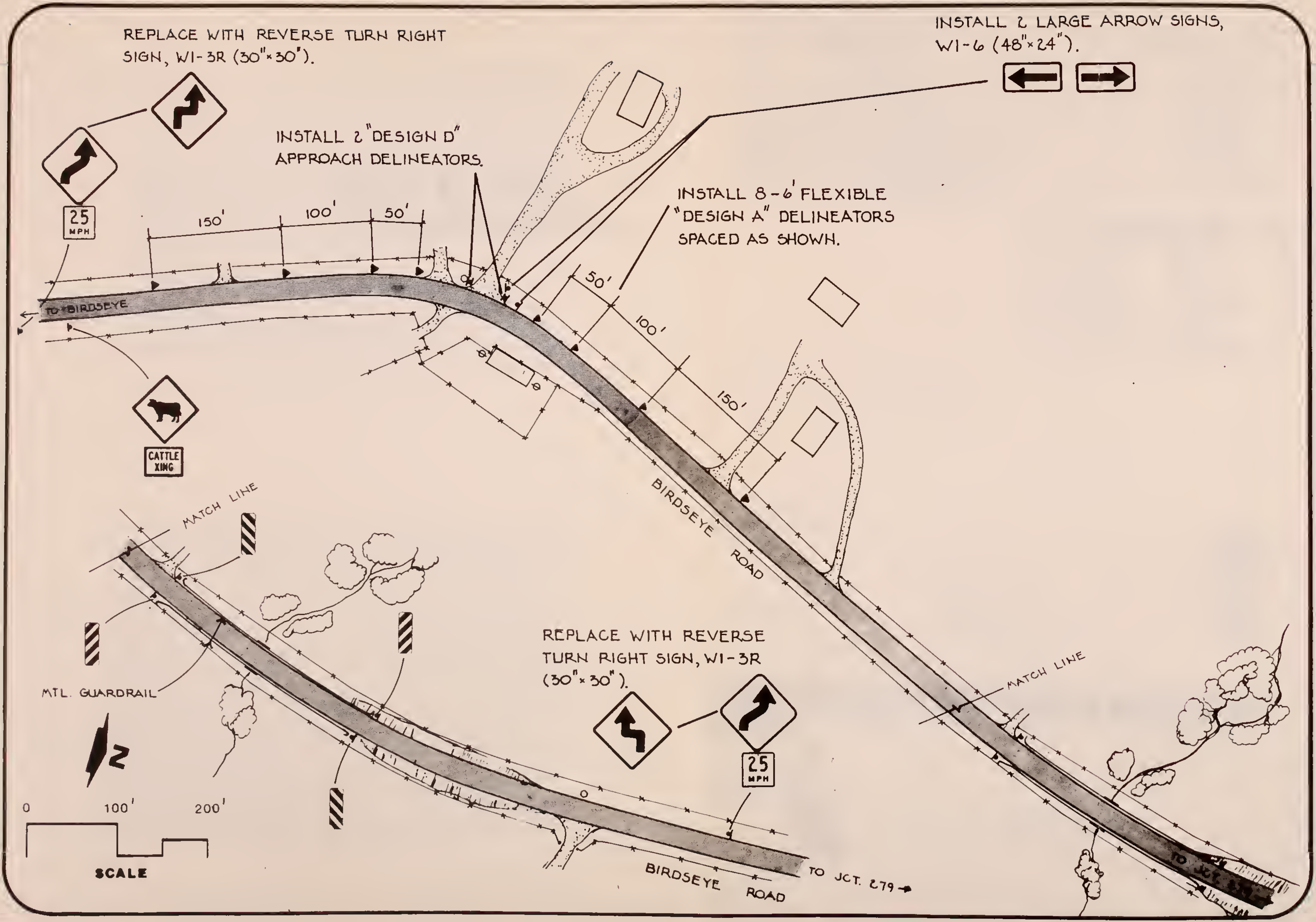
SITE NO. 6

Lewis & Clark County

Existing Conditions & Accidents

Birdseye Road-Curve

Fig. No.
6-1


REPLACE WITH REVERSE TURN RIGHT SIGN, W1-3R (30"×30").
25 MPH
INSTALL 2 "DESIGN D" APPROACH DELINEATORS.
INSTALL 2 LARGE ARROW SIGNS, W1-6 (48"×24").
INSTALL 8-6' FLEXIBLE "DESIGN A" DELINEATORS SPACED AS SHOWN.
150'
100'
50'
50'
100'
150'
TO BIRDSEYE
CATTLE XING
BIRDSEYE ROAD
MATCH LINE
MATCH LINE
MTL. GUARDRAIL
REPLACE WITH REVERSE TURN RIGHT SIGN, W1-3R (30"×30").
25 MPH
N
0
100'
200'
SCALE
BIRDSEYE ROAD
TO JCT. 279 →
TO JCT. 279

Recommended Improvements

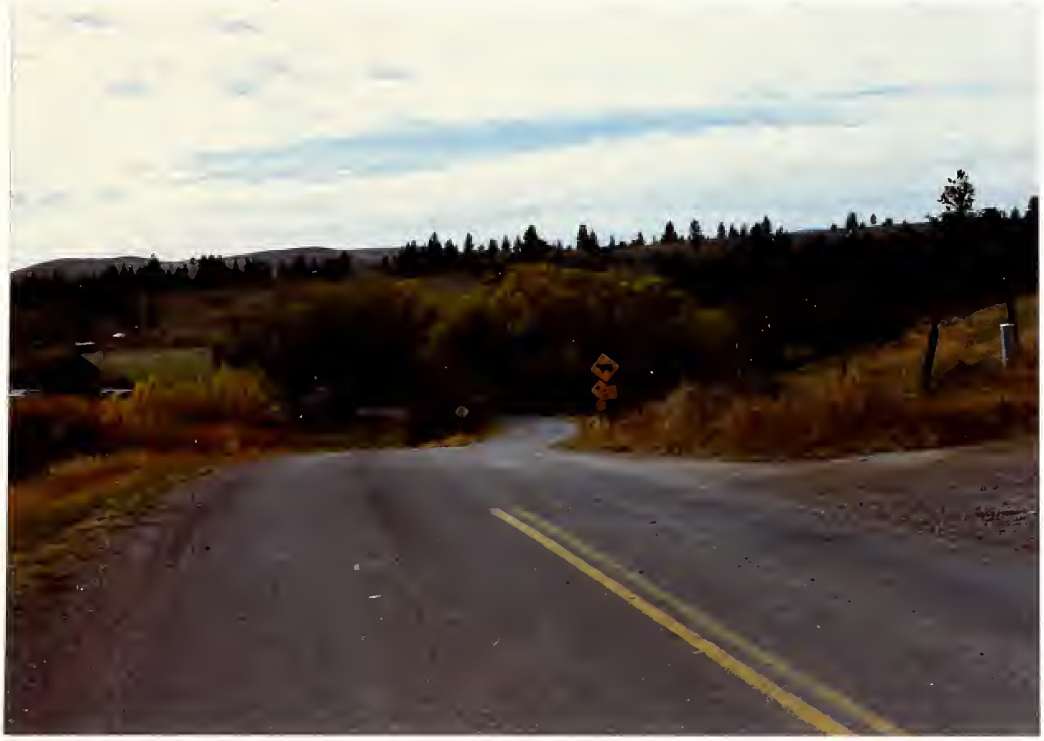
Birdseye Road-Curve

SITE NO. 6

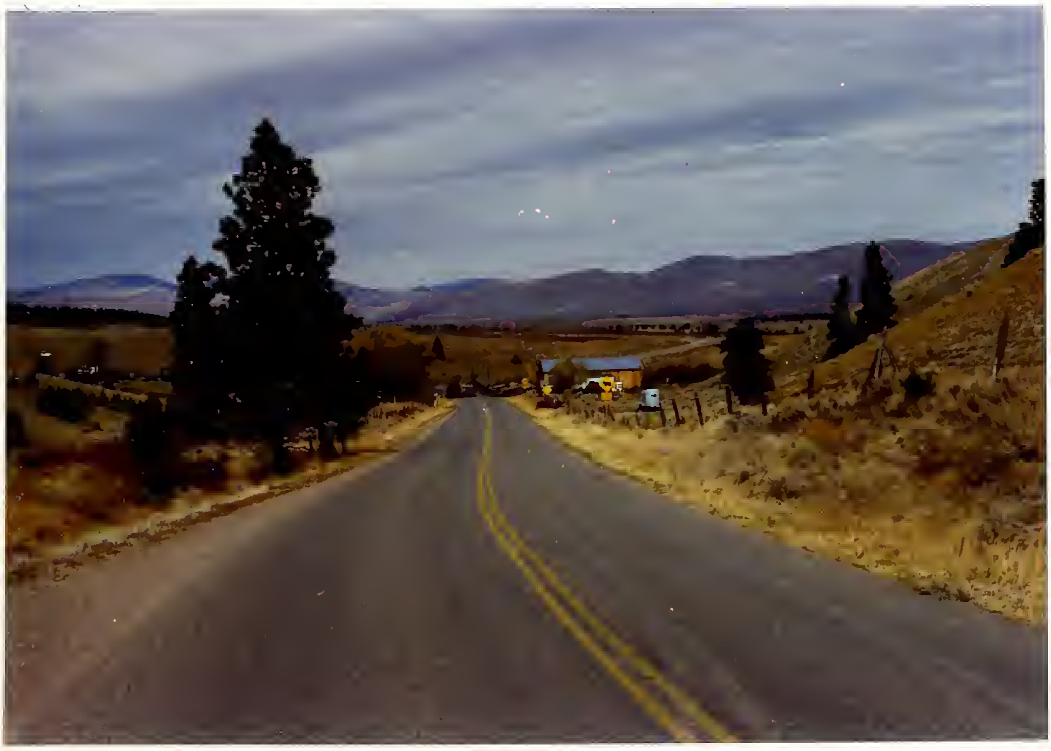
Lewis & Clark County

Fig. No.
6-2

SITE NO.7



Site 7 - North Approach



Site 7 - South Approach

SITE NO. 7

BIRDSEYE ROAD AND THREE MILE CREEK BRIDGE

A. DESCRIPTION

This site is located on Birdseye Road approximately 3.5 miles north of the intersection of Austin Road. The site is located in Section 1, Range 5W, Township 11N. The location is a curve at the intersection of Three Mile Creek and Birdseye Road.

The 1988 average daily average traffic at this location is 338 vpd.

The existing site characteristics are shown on Figure 7-1.

B. ACCIDENT ANALYSIS

Seven accidents occurred at this site during the four-year period from 1984 through 1987. The following is a summary of characteristics that are pertinent in determining factors that may have contributed to the accidents:

* Four (80 percent) of the accidents occurred on weekdays.

* Four (80 percent) of the accidents occurred during hours of darkness.

* Four (80 percent) of the accidents occurred when the road was dry.

* Three (60 percent) of the accidents occurred in the past two years.

* Four (80 percent) of the accidents resulted in property damage only.

* Four (80 percent) of the accidents involved single vehicles leaving the road. The other accident involved a collision with a horse.

* The investigating officers' analysis attributed the accidents to the following factors: careless driving and speed too fast for existing conditions.

Accident diagrams are shown on Figure 7-1. Table 7-1 summarizes accident characteristics at the site.

C. EVALUATION

The following factors pertaining to the site were determined from the field survey and accident analysis:

1. Three of the accidents involved southbound single vehicles leaving the road at the curve. Since 80 percent of the accidents occurred at night, improved delineation and arrow signs on the curve may be needed.

D. RECOMMENDATIONS

The following improvements are recommended for this site.

1. Add fourteen 6-foot flexible Design A delineators on the curve as shown on Figure 7-2.
2. Install two W1-6, 48"x24" large arrow signs on a single post to be located in the field at time of installation. The approximate location is shown on Figure 7-2.

E. COST

1.	Install 14 6' flexible Design A delineators	$280.00
2.	Install 2 W1-6, 48"x24" Double Arrow signs	280.00

TOTAL COST	$560.00

F. HAZARD AND PRIORITY INDICES

Based on the information collected and the foregoing analysis, the hazard index for this location is determined to be 64.28. The priority index is 72.96. The calculations are shown in Table 7-2.

ACCIDENT SUMMARY

SITE NUMBER 7   ACCIDENT PERIOD 1984-1987

NUMBER OF ACCIDENTS BY YEAR

1984	1985	1986	1987
1	1	2	1

NUMBER OF ACCIDENTS BY DAY OF WEEK

Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
	1	1		1	1	1

NUMBER OF ACCIDENTS BY MONTH

Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
		1	1	2	1						

-- AM -- NUMBER OF ACCIDENTS BY TIME OF DAY -- PM --

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
	1								1											1	1		1

NUMBER OF ACCIDENTS BY LIGHT CONDITIONS

Day-light	Dark	Dawn	Dusk
1	4		

NUMBER OF ACCIDENTS BY ROAD CONDITIONS

Dry	Wet	Snow	Ice	Other
4				1

NUMBER OF ACCIDENTS BY WEATHER CONDITIONS

Clear	Rain	Snow	Fog
3	1	1	

NUMBER OF ACCIDENTS BY ACCIDENT TYPE

Angle	Turn	Rear End	Fixed Object	Ped.	Animal	Side-swipe	Non-Col	Head-on	Backing
			3		1		1		

NUMBER OF ACCIDENTS BY POSSIBLE VIOLATION

No Violat.	Drinking	Reckless Driving	Speed	Right-of-Way	Improper Passing	Improper Backing	Improper Turning	Other
1		2	2					

NUMBER OF ACCIDENTS BY SEVERITY

	1984	1985	1986	1987
Injury			1	
Fatality				
Property Dam. Only	1	1	1	1

NUMBER OF ACCIDENTS ALCOHOL INVOLVED

0

HAZARD INDEX CALCULATION

Site Number 7 Date 10/15/88

Site Description Birdseye Road - Curve at Three Mile Creek

Indicator	Data Value		Indicator Value		Weight		Partial H.I.'s
Number of Accidents	1.25	acc/yr	31	X	0.164	=	5.08
Accident Rate	8.83	acc/MVE	93	X	0.225	=	20.93
Accident Severity	$9,900	dollars	62	X	0.191	=	11.84
Volume/Capacity Ratio	.08		23	X	0.082	=	1.89
Sight Distance Ratio	< .5	(wt.ave.)	100	X	0.074	=	7.40
Driver Expectancy	4.2	(wt.ave.)	71	X	0.149	=	10.58
Information System Deficiencies	3.5	(wt.ave.)	57	X	0.115	=	6.56

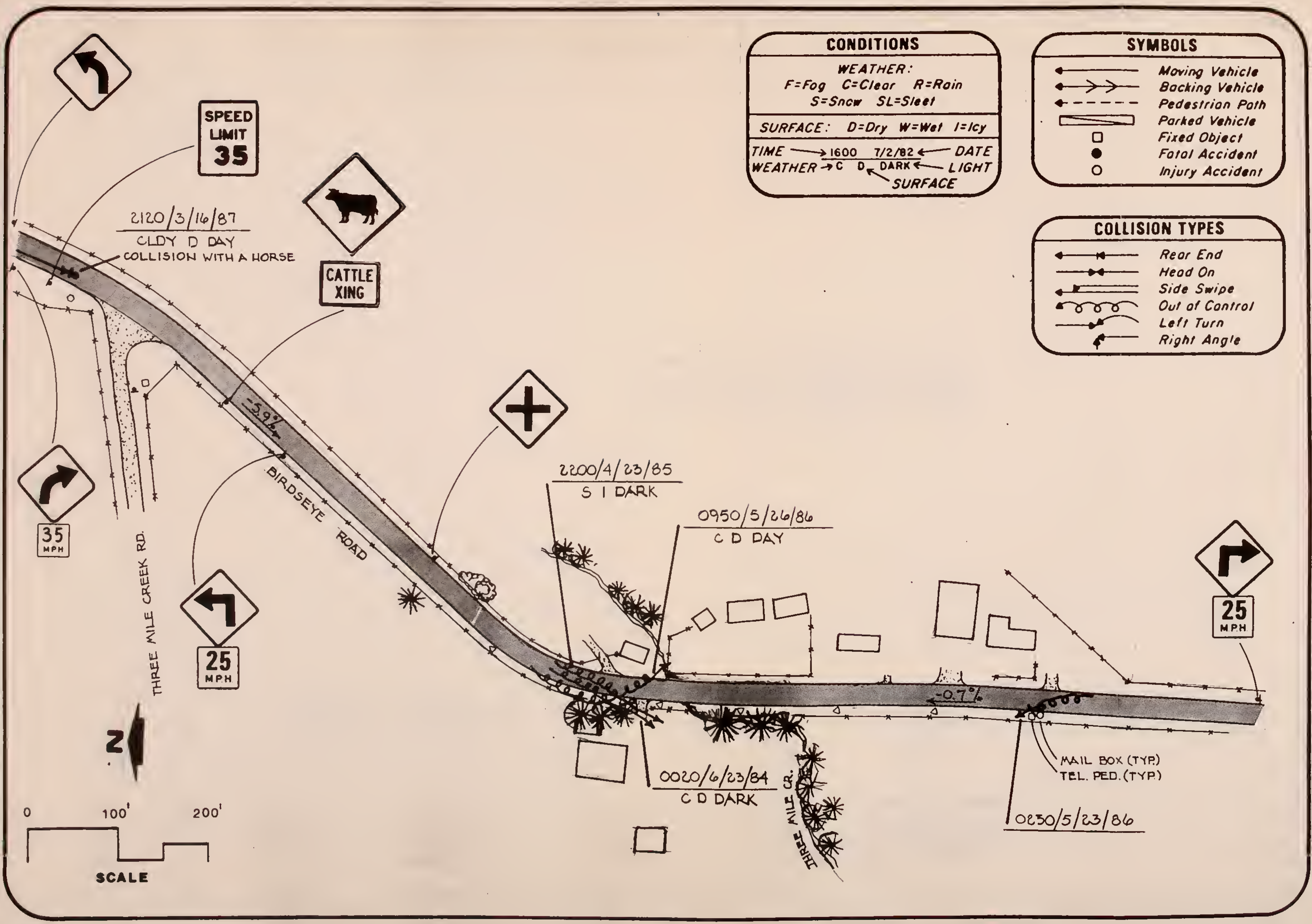
Hazard Index: 64.28

Cost of Recommended Improvements: $560.00

Cost Factor: 99

Priority Index = Hazard Index X .75 + Cost Factor X .25

64.28 X .75 + 99 X .25 = 72.96



Existing Conditions & Accidents

Birdseye Road-Curve

SITE NO. 7

Lewis & Clark County

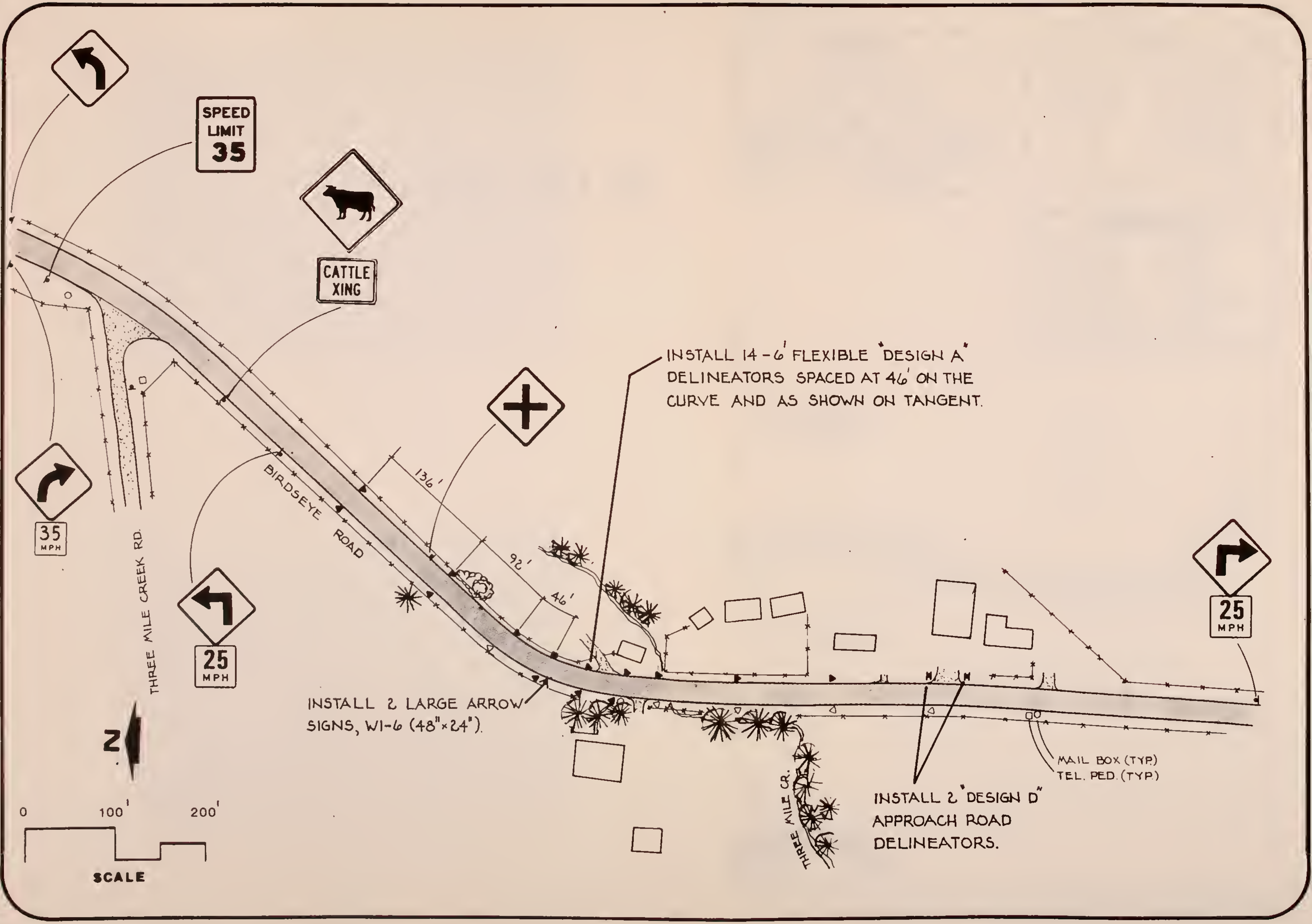
Fig. No.
7-1

SITE NO. 7

Lewis & Clark County

Recommended Improvements

Birdseye Road-Curve



INSTALL 14 - 6' FLEXIBLE "DESIGN A" DELINEATORS SPACED AT 46' ON THE CURVE AND AS SHOWN ON TANGENT.

INSTALL 2 LARGE ARROW SIGNS, W1-6 (48"×24").

INSTALL 2 "DESIGN D" APPROACH ROAD DELINEATORS.

Fig. No. 7-2

SITE NO.8

Site 8 - Southeast Approach

Site 8 - Northwest Approach

SITE NO. 8

BEARTOOTH ROAD - CURVE

A. DESCRIPTION

This site is located approximately 3.6 miles southeast of the frontage road. The site is located in Section 10, Range 3W, Township 14N.

Beartooth Road provides access to recreational facilities located along the northeast side of Holter Lake.

Traffic volumes on this road reach their peak in July when the average daily traffic is nearly double the annual average daily traffic. The 1988 average daily traffic at this location is 180 vpd.

The existing site characteristics are shown on Figure 8-1.

B. ACCIDENT ANALYSIS

Five accidents occurred at this site during the four-year period from 1984 through 1987. The following is a summary of characteristics that are pertinent in determining factors that may have contributed to the accidents:

* Two (40 percent) of the accidents occurred on weekends.

* Three (60 percent) of the accidents occurred during daylight hours.

* Four (80 percent) of the accidents occurred when the road was dry.

* Four (80 percent) of the accidents involved single vehicles leaving the road.

* Four (80 percent) of the accidents resulted in property damage only.

* The investigating officers' analysis attributed the accidents to the following factors: careless driving and speed too fast for conditions.

Accident diagrams are shown on Figure 8-1. Table 8-1 summarizes accident characteristics at the site.

C. EVALUATION

The following factors pertaining to the site were determined from the field survey and accident analysis:

1. This sharp curve is typical of the entire road. The road is a series of sharp curves following the foothills above Holter Lake. The curve was ball-banked at 15 MPH.

2. Three of the accidents occurred on the southeast curve.

D. RECOMMENDATIONS

The following improvements are recommended for this site.

1. Install ten 6-foot flexible Design A delineators on the northwest curve and eleven 6-foot flexible Design A delineators on the southeast curve as shown on Figure 8-2.

2. Install two W1-5a, 30"x30" curve signs with 15 MPH W13-1, 18"x18" advisory speed plates on the northwest and southeast approaches.

3. Install two W1-6, 48"x24" large arrow signs on the southeast curve as shown on Figure 8-2.

The recommended improvements are shown in Figure 8-2.

E. COST

1.	Install two W1-5a, 30"x30" curve signs with two W13-1, 18"x18" 15 MPH advisory speed plates	$280.00
2.	Install 21 6-ft. flexible Design A delinators	420.00
3.	Install two W1-6, 48"x24" large arrow signs	280.00
TOTAL COST		$980.00

F. HAZARD AND PRIORITY INDICES

Based on the information collected and the foregoing analysis, the hazard index for this location is determined to be 68.12. The priority index is 75.59. The calculations are shown in Table 8-2.

ACCIDENT SUMMARY

SITE NUMBER 8 ACCIDENT PERIOD 1984-1987

NUMBER OF ACCIDENTS BY YEAR

1984	1985	1986	1987
4	1		

NUMBER OF ACCIDENTS BY DAY OF WEEK

Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
1			1	1	1	1

NUMBER OF ACCIDENTS BY MONTH

Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
				1	2		1			1	

-- AM -- NUMBER OF ACCIDENTS BY TIME OF DAY -- PM --

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
															1	1				1	1	1	

NUMBER OF ACCIDENTS BY LIGHT CONDITIONS

Daylight	Dark	Dawn	Dusk
3	2		

NUMBER OF ACCIDENTS BY ROAD CONDITIONS

Dry	Wet	Snow	Ice	Other
4	1			

NUMBER OF ACCIDENTS BY WEATHER CONDITIONS

Clear	Rain	Snow	Fog
5			

NUMBER OF ACCIDENTS BY ACCIDENT TYPE

Angle	Turn	Rear End	Fixed Object	Ped.	Animal	Side-swipe	Non-Col	Head-on	Backing
			1				3	1	

NUMBER OF ACCIDENTS BY POSSIBLE VIOLATION

No Violat.	Drinking	Reckless Driving	Speed	Right-of-Way	Improper Passing	Improper Backing	Improper Turning	Other
2		1	2					

NUMBER OF ACCIDENTS BY SEVERITY

	1984	1985	1986	1987
Injury	1			
Fatality				
Property Dam. Only	3	1		

NUMBER OF ACCIDENTS ALCOHOL INVOLVED

0

HAZARD INDEX CALCULATION

Site Number 8 Date 10/15/88

Site Description Beartooth Road - Curves

Indicator	Data Value		Indicator Value		Weight		Partial H.I.'s
Number of Accidents	1.25	acc/yr	27	X	0.164	=	4.43
Accident Rate	19.02	acc/MVE	100	X	0.225	=	22.50
Accident Severity	$13,840	dollars	71	X	0.191	=	13.56
Volume/Capacity Ratio	.04		17	X	0.082	=	1.39
Sight Distance Ratio	< .5	(wt.ave.)	100	X	0.074	=	7.40
Driver Expectancy	3.5	(wt.ave.)	57	X	0.149	=	8.49
Information System Deficiencies	5.5	(wt.ave.)	90	X	0.115	=	10.35

Hazard Index: 68.12

Cost of Recommended Improvements: $980.00

Cost Factor: 98

Priority Index = Hazard Index X .75 + Cost Factor X .25

68.12 X .75 + 98 X .25 = 75.59

SITE NO. 8

Lewis & Clark County

Existing Conditions & Accidents

Beartooth Road-Curve

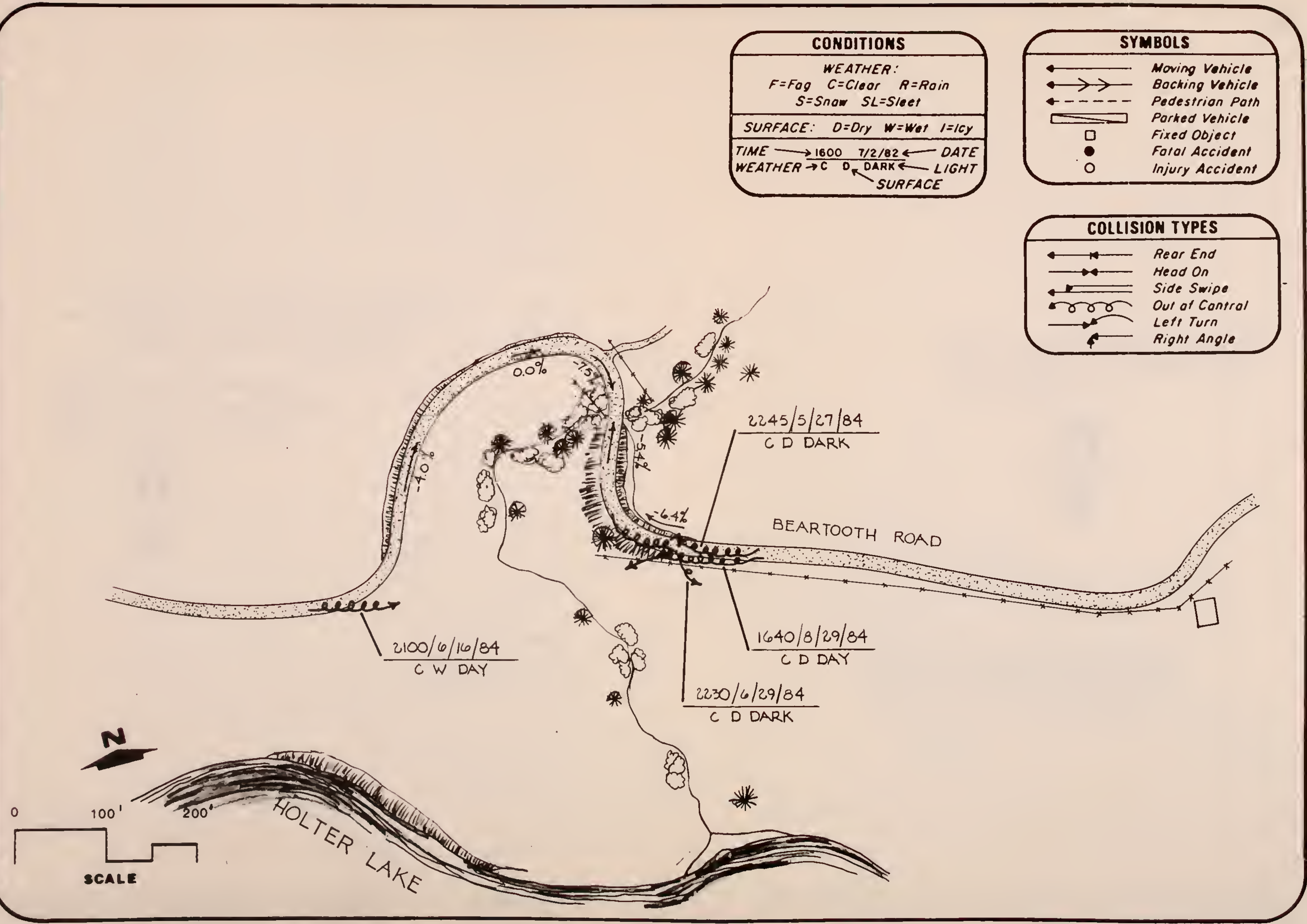
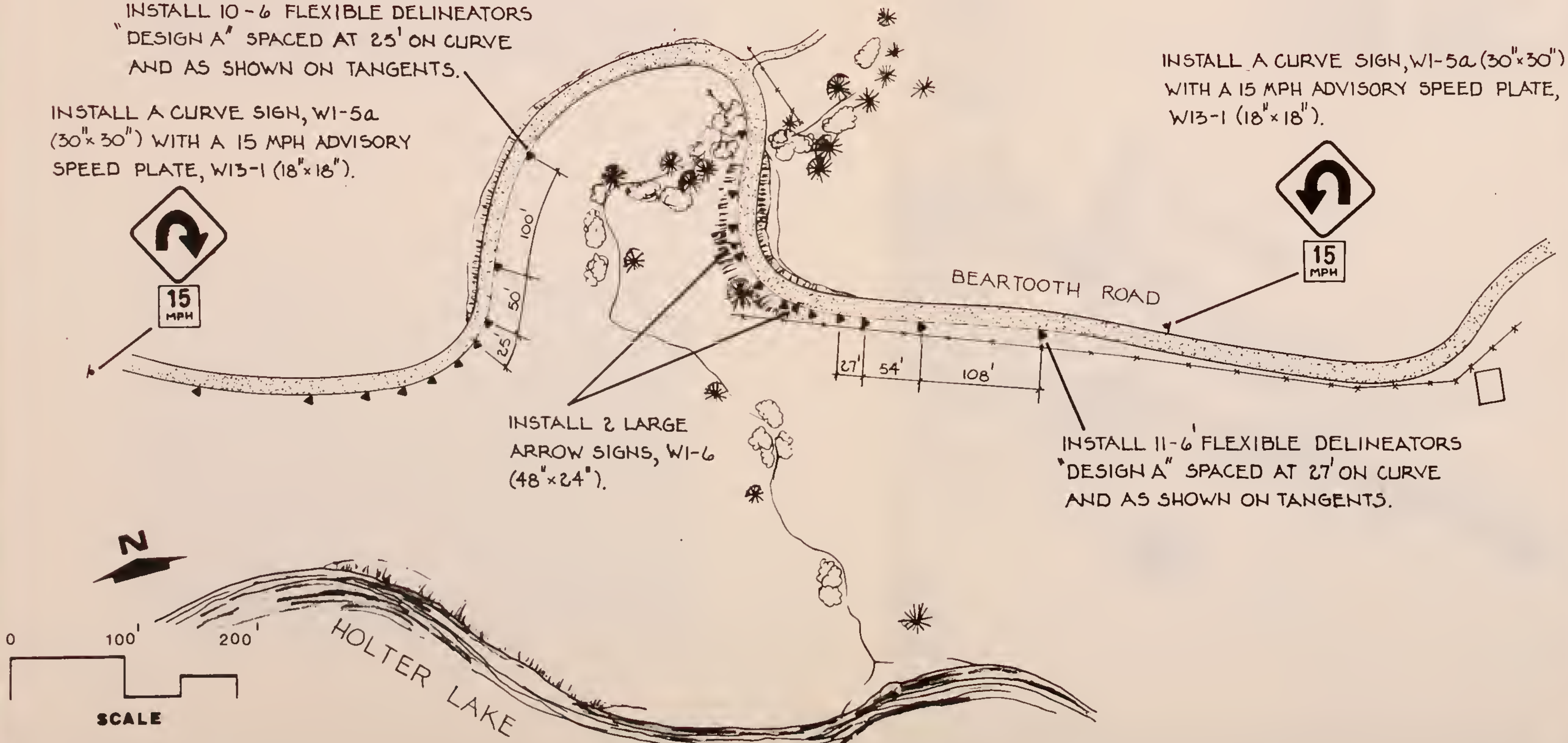


Fig. No.
8-1



INSTALL 10-6' FLEXIBLE DELINEATORS "DESIGN A" SPACED AT 25' ON CURVE AND AS SHOWN ON TANGENTS.

INSTALL A CURVE SIGN, W1-5a (30"×30") WITH A 15 MPH ADVISORY SPEED PLATE, W13-1 (18"×18").

INSTALL A CURVE SIGN, W1-5a (30"×30") WITH A 15 MPH ADVISORY SPEED PLATE, W13-1 (18"×18").

INSTALL 2 LARGE ARROW SIGNS, W1-6 (48"×24").

INSTALL 11-6' FLEXIBLE DELINEATORS "DESIGN A" SPACED AT 27' ON CURVE AND AS SHOWN ON TANGENTS.

Recommended Improvements

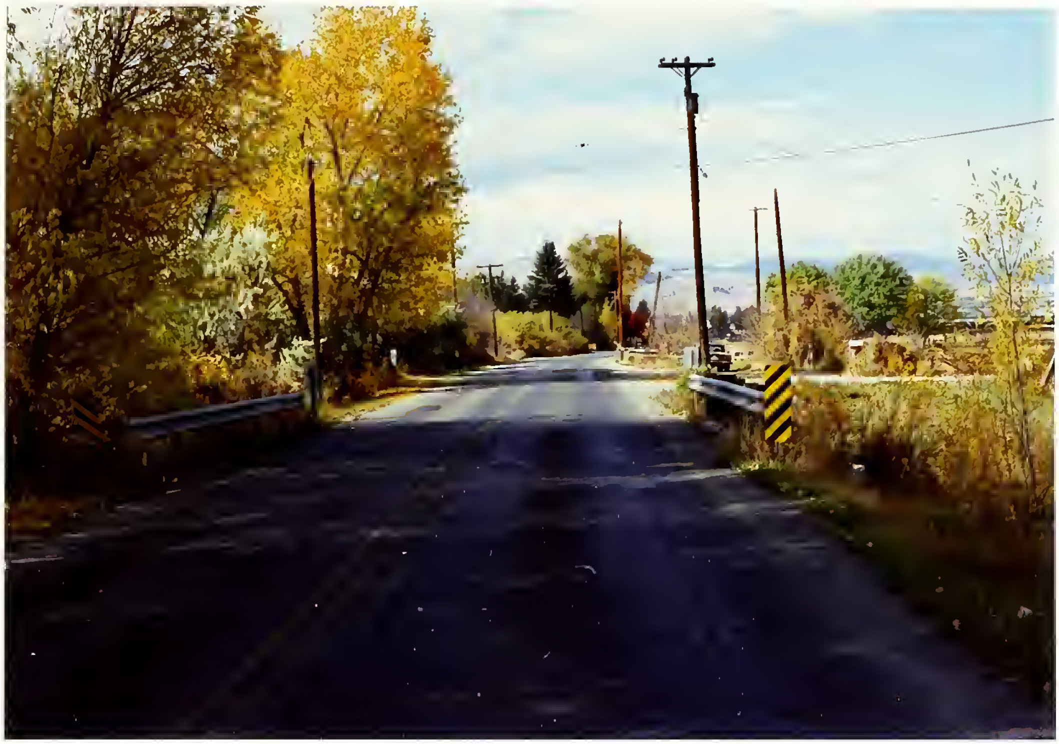
Beartooth Road- Curve

SITE NO. 8

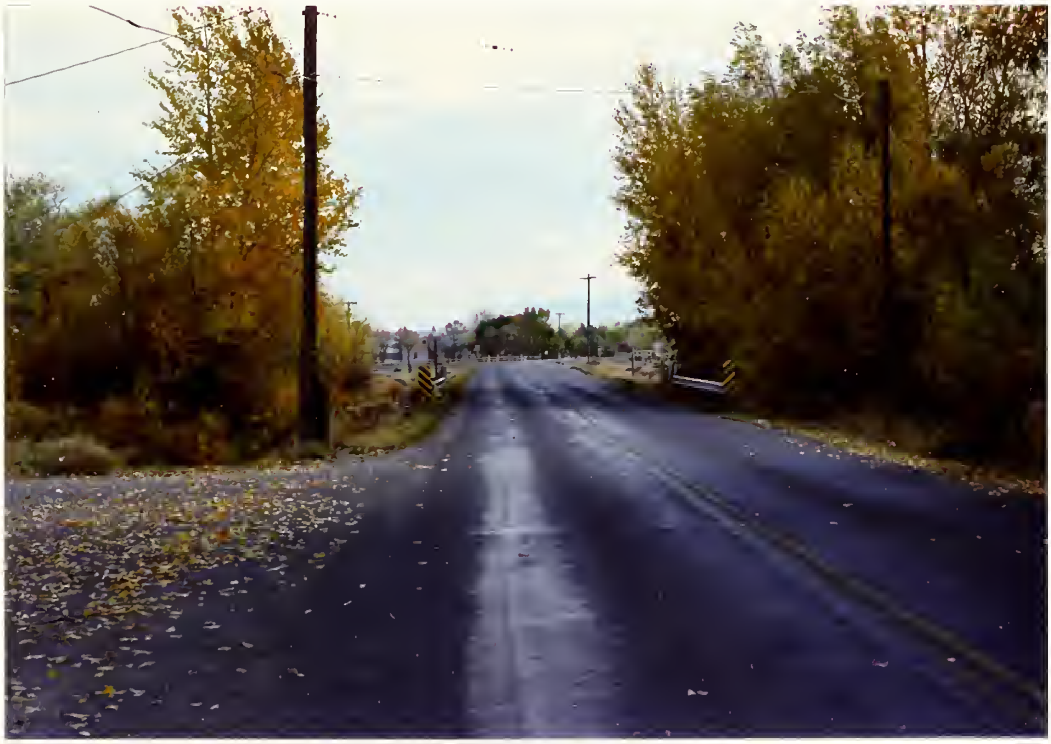
Lewis & Clark County

Fig. No.
8-2

SITE NO. 9



Site 9 - East Approach



Site 9 - West Approach

SITE NO. 9

COUNTRY CLUB AVENUE AND TEN MILE CREEK BRIDGE

A. DESCRIPTION

This site is located approximately 0.75 mile west of the west city limits of Helena. The site is located in Section 23, Range 4W, Township 10N.

Country Club Avenue provides access to Green Meadow Country Club and Golf Course, Fort Harrison, and the Birdseye residential areas. Traffic volumes on this route are increasing due to expansion of the Montana National Guard facilities at Fort Harrison and the continuing residential development in the Birdseye area. The installation of maintenance and repair facilities at the Montana National Guard Base will generate additional heavy truck traffic and commuter traffic on Country Club Drive.

The 1988 average daily traffic at this site is 2,190 vpd.

The existing site characteristics are shown on Figure 9-1.

B. ACCIDENT ANALYSIS

Three accidents occurred at this site during the four-year period from 1984 through 1987. The following is a summary of characteristics that are pertinent in determining factors that may have contributed to the accidents:

* Four (80 percent) of the accidents occurred on weekdays.

* Three (60 percent) of the accidents occurred during hours of darkness.

* Four (80 percent) of the accidents occurred when the road condition was icy.

* Three (60 percent) of the accidents occurred in 1987.

* All accidents involved single vehicles leaving the road.

* One (20 percent) of the accidents involved alcohol.

* The investigating officers' analysis attributed the accidents to the following driver-related factors: alcohol and careless driving.

Accident diagrams are shown on Figure 9-1. Table 9-1 summarizes accident characteristics at the site.

C. EVALUATION

The following factors pertaining to the site were determined from the field survey and accident analysis:

1. Eighty percent of the accidents occurred during icy conditions. Sixty percent occurred on the bridge, indicating that the bridge deck may retain ice.

2. Eighty percent of the accidents involved eastbound vehicles, indicating that approach speeds from the west may be excessive.

D. RECOMMENDATIONS

The following improvements are recommended for this site.

1. Trim trees on the southwest bridge approach to improve sight distance and to remove shade from the bridge deck.

2. Install "W" beams and treatment with anchors on the four bridge guard rail ends. This will help to strengthen the bridge and improve safety.

3. Install reflectorized washers on the bridge guard rail to improve night visibility.

4. Install four Design D approach delineators at the intersections of Broadwater Avenue and Country Club Avenue and Green Meadow Country Club entrance and Country Club avenue.

5. Replace the existing W1-2R and W1-2L curve signs on the west and south approaches at Joslyn and Country Club Avenue with W1-1R, 30"x30" Turn Right and W1-1L, 30"x30" Turn Left signs with W13-1, 18"x18" 25 MPH Advisory Speed plates.

6. Install two W15-1, 36"x36" playground signs at the Spring Meadow State Park.

7. Reverse speed limit signing as shown.

E. COST

1.	Trim trees	$200.00
2.	Install "W" beam end treatment with anchors on the bridge guard rail ends	4,000.00
3.	Install reflectorized washers on bridge guard rail	60.00

4.	Install 4 Design D approach delineators	40.00
5.	Install W1-2R, 30"x30" and W1-2L 30"x30" Right and Left Turn signs with W13-1, 18"x18" 25 MPH advisory speed plates	280.00
6.	Install two W15-1, 36"x36" Playground signs	280.00
7.	Install three R2-1, 24"x30" Speed Limit signs	300.00
	TOTAL COST:	$5,160.00

F. HAZARD AND PRIORITY INDICES

Based on the information collected and the foregoing analysis, the hazard index for this location is determined to be 39.91. The priority index is 54.68. The calculations are shown in Table 9-2.

ACCIDENT SUMMARY

SITE NUMBER 9 ACCIDENT PERIOD 1984-1987

NUMBER OF ACCIDENTS BY YEAR

1984	1985	1986	1987
2			3

NUMBER OF ACCIDENTS BY DAY OF WEEK

Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
	1	1			2	1

NUMBER OF ACCIDENTS BY MONTH

Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1		2				1					1

-- AM -- NUMBER OF ACCIDENTS BY TIME OF DAY -- PM --

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
			1				2		1														1

NUMBER OF ACCIDENTS BY LIGHT CONDITIONS

Daylight	Dark	Dawn	Dusk
2	3		

NUMBER OF ACCIDENTS BY ROAD CONDITIONS

Dry	Wet	Snow	Ice	Other
1			4	

NUMBER OF ACCIDENTS BY WEATHER CONDITIONS

Clear	Rain	Snow	Fog
2	2	1	

NUMBER OF ACCIDENTS BY ACCIDENT TYPE

Angle	Turn	Rear End	Fixed Object	Ped.	Animal	Sideswipe	Non-Col	Head-on	Backing
			3				2		

NUMBER OF ACCIDENTS BY POSSIBLE VIOLATION

No Violat.	Drinking	Reckless Driving	Speed	Right-of-Way	Improper Passing	Improper Backing	Improper Turning	Other
3	1	1						

NUMBER OF ACCIDENTS BY SEVERITY

	1984	1985	1986	1987
Injury	1			2
Fatality				
Property Dam. Only	1			1

NUMBER OF ACCIDENTS ALCOHOL INVOLVED

1

HAZARD INDEX CALCULATION

Site Number 9 Date 10/15/88

Site Description Country Club Avenue - Ten Mile Creek Bridge

Indicator	Data Value		Indicator Value		Weight		Partial H.I.'s
Number of Accidents	1.25	acc/yr	27	X	0.164	=	4.43
Accident Rate	1.56	acc/MVE	26	X	0.225	=	5.85
Accident Severity	$12,400	dollars	68	X	0.191	=	12.99
Volume/Capacity Ratio	0.27		42	X	0.082	=	3.44
Sight Distance Ratio	2.0	(wt.ave.)	0	X	0.074	=	-
Driver Expectancy	3.0	(wt.ave.)	50	X	0.149	=	7.45
Information System Deficiencies	3.0	(wt.ave.)	50	X	0.115	=	5.75

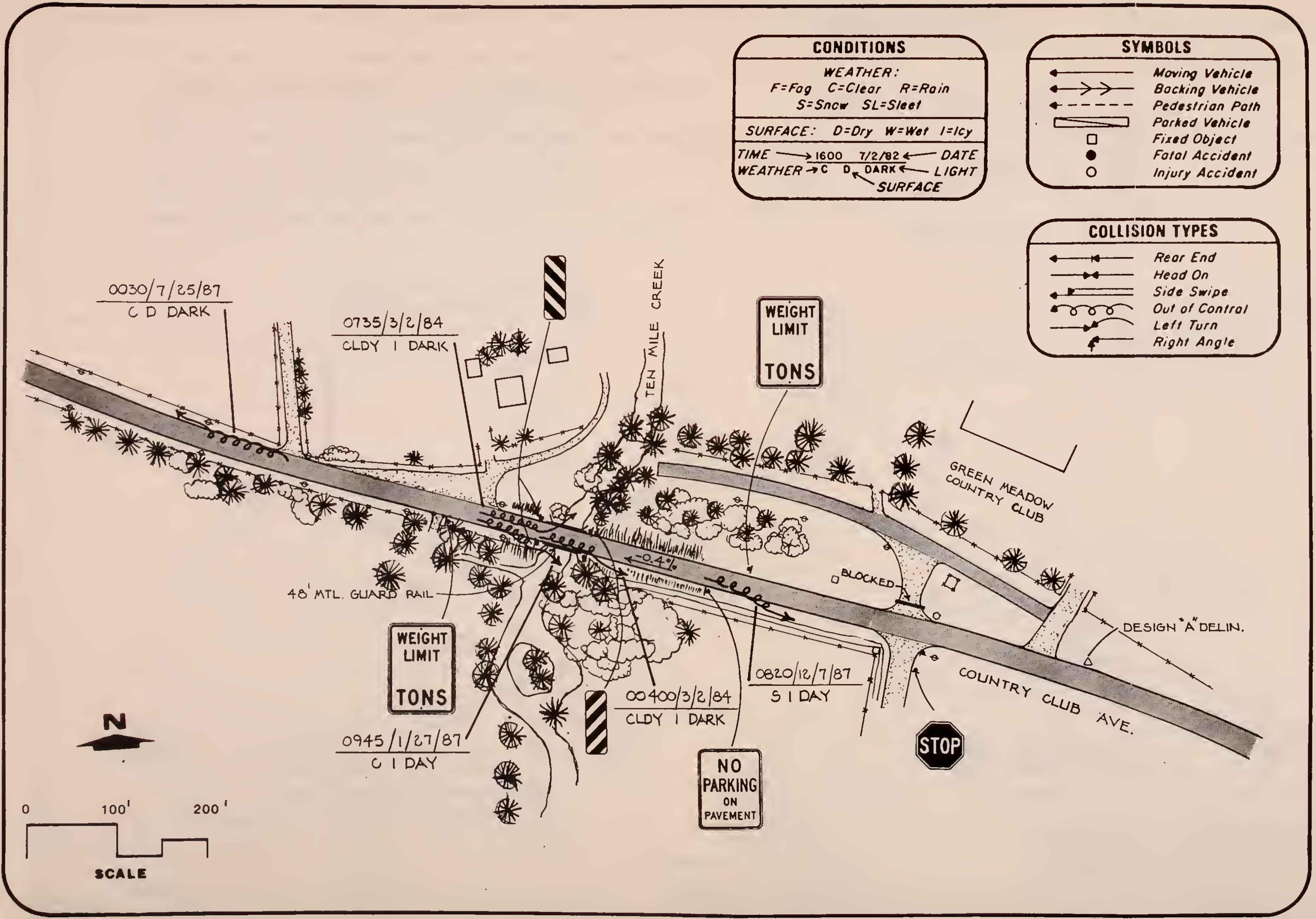
Hazard Index: 39.91

Cost of Recommended Improvements: $5,160.00

Cost Factor: 99

Priority Index = Hazard Index X .75 + Cost Factor X .25

39.91 X .75 + 99 X .25 = 54.68



Existing Conditions & Accidents

Country Club Ave.-Ten Mile Creek Bridge

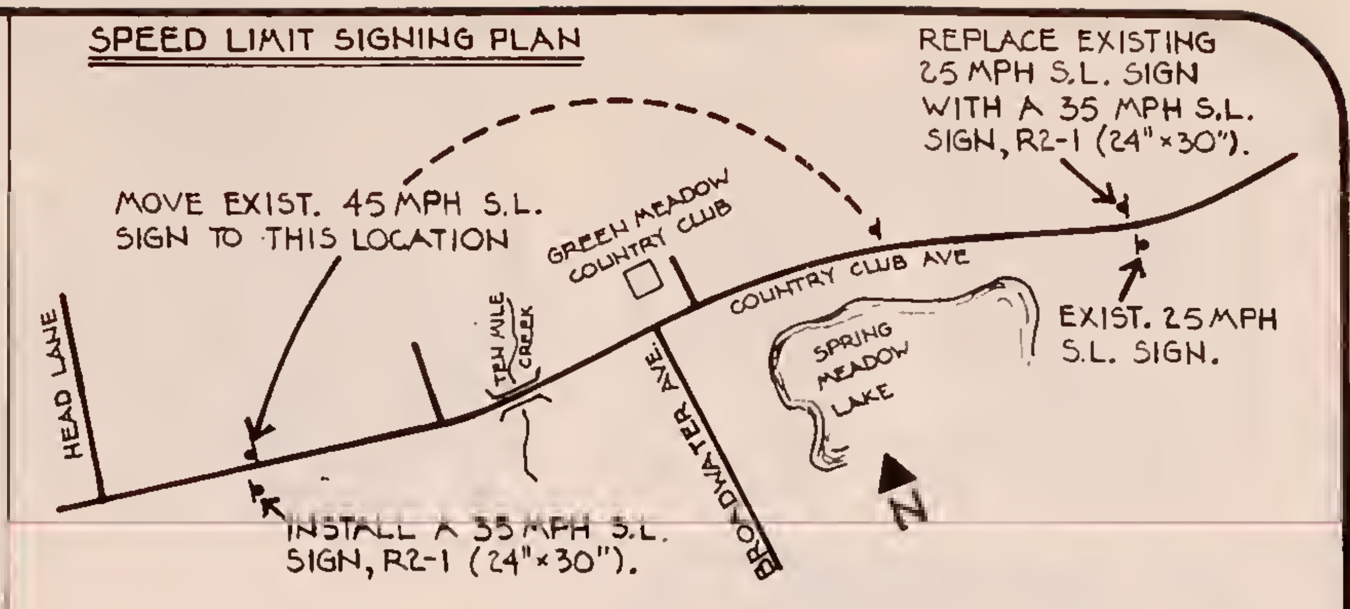
SITE NO. 9

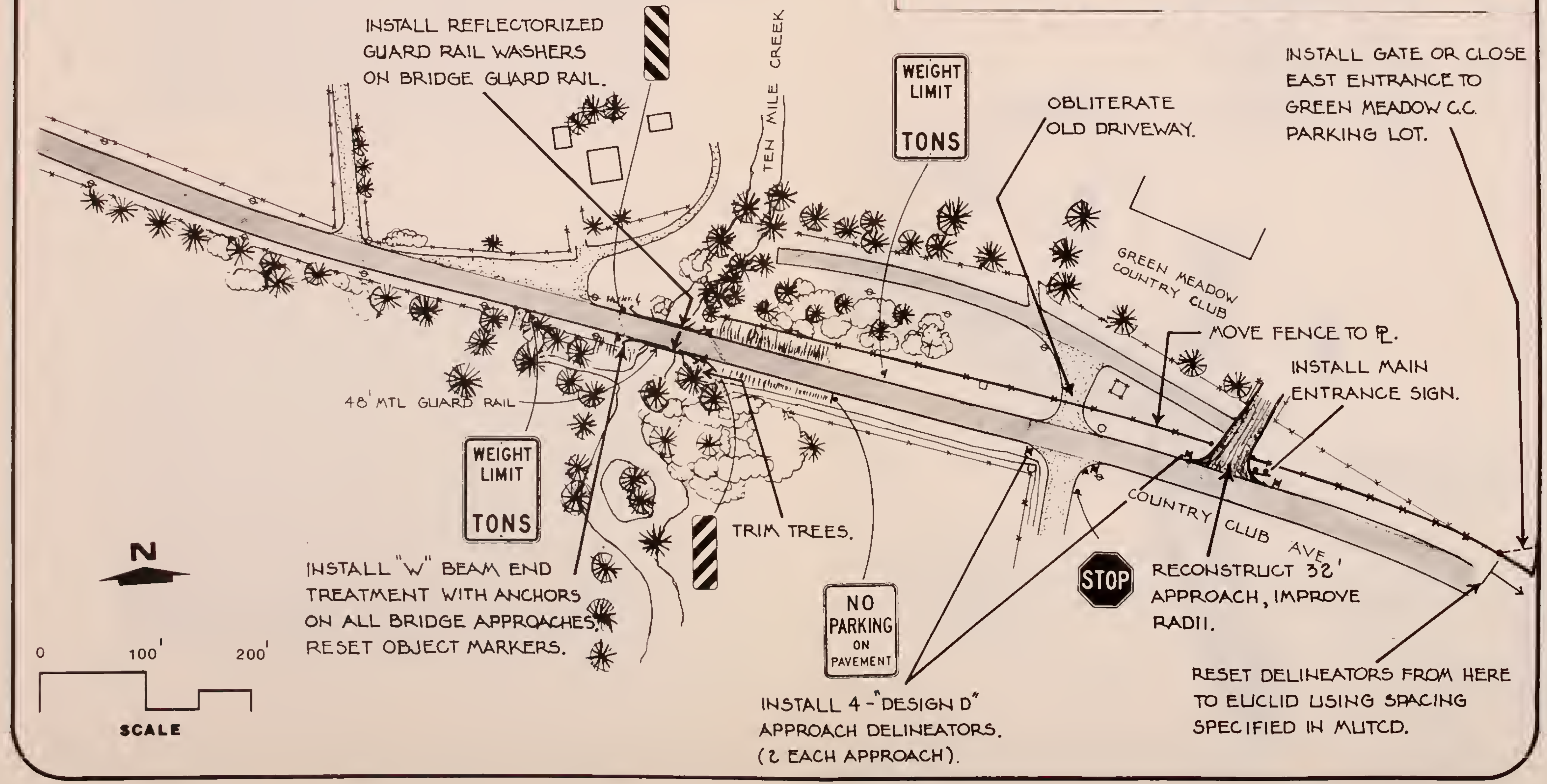
Lewis & Clark County

Fig. No.
9-1

NOTE: THE FOLLOWING IMPROVEMENTS ARE RECOMMENDED FROM THE GREEN MEADOW COUNTRY CLUB TO EUCLID:

1. RESET DELINEATORS TO SPACING RECOMMENDED IN THE MUTCD.
2. REPLACE EXISTING CURVE SIGNS (W1-2R) ON SOUTH AND WEST APPROACHES TO JOSLYN ST. WITH RIGHT TURN SIGNS, W1-1R (30"×30") WITH 25 MPH ADVISORY SPEED PLATES, W13-1 (18"×18").
3. INSTALL 2 PLAYGROUND SIGNS, W15-1 (36"×36") AT SPRING MEADOW LAKE.


SPEED LIMIT SIGNING PLAN
REPLACE EXISTING 25 MPH S.L. SIGN WITH A 35 MPH S.L. SIGN, R2-1 (24"×30").
MOVE EXIST. 45 MPH S.L. SIGN TO THIS LOCATION
GREEN MEADOW COUNTRY CLUB
COUNTRY CLUB AVE
EXIST. 25 MPH S.L. SIGN.
HEAD LANE
TEN MILE CREEK
BROADWATER AVE.
SPRING MEADOW LAKE
N
INSTALL A 35 MPH S.L. SIGN, R2-1 (24"×30").


INSTALL REFLECTORIZED GUARD RAIL WASHERS ON BRIDGE GUARD RAIL.
TEN MILE CREEK
WEIGHT LIMIT TONS
OBLITERATE OLD DRIVEWAY.
INSTALL GATE OR CLOSE EAST ENTRANCE TO GREEN MEADOW C.C. PARKING LOT.
GREEN MEADOW COUNTRY CLUB
MOVE FENCE TO ℄.
INSTALL MAIN ENTRANCE SIGN.
48' MTL GUARD RAIL
WEIGHT LIMIT TONS
TRIM TREES.
COUNTRY CLUB AVE.
STOP
RECONSTRUCT 32' APPROACH, IMPROVE RADII.
N
INSTALL "W" BEAM END TREATMENT WITH ANCHORS ON ALL BRIDGE APPROACHES. RESET OBJECT MARKERS.
NO PARKING ON PAVEMENT
0
100'
200'
SCALE
INSTALL 4 -"DESIGN D" APPROACH DELINEATORS. (2 EACH APPROACH).
RESET DELINEATORS FROM HERE TO EUCLID USING SPACING SPECIFIED IN MUTCD.

Recommended Improvements

Country Club Ave.-Ten Mile Creek Bridge

SITE NO. 9

Lewis & Clark County

Fig. No. 9-2

SITE NO.10

Site 10 - Southeast Approach

Site 10 - West Approach

SITE NO. 10

LAKE HELENA DRIVE AND LAKE HELENA CAUSEWAY

A. DESCRIPTION

This site is located at a bridge and causeway crossing Lake Helena approximately 4.0 miles north of the intersection of Lake Helena Drive and York Road (FAS 280). The site is located in Section 19, Range 2W, Township 11N.

The roadway approaches from the east with a curve and downhill grade. The 40-foot bridge is located on the east end of the causeway. The causeway is a raised fill approximately six feet above the water level. The causeway is used for parking by fishermen. Fishing is a year-round activity at this location.

The 1988 average daily traffic at this site is 274 vpd

The existing site characteristics are shown on Figure 10-1.

B. ACCIDENT ANALYSIS

Five accidents occurred at this site during the four-year period from 1984 through 1987. The following is a summary of characteristics that are pertinent in determining factors that may have contributed to the accidents:

* Two (40 percent) of the accidents occurred on weekends.

* Four (80 percent) of the accidents occurred during hours of darkness.

* Four (80 percent) of the accidents occurred on a dry road.

* Three (60 percent) of the accidents occurred in 1984.

* Four (80 percent) of the accidents involved single vehicles leaving the roadway at the Causeway bridge and going into the lake (10 to 20 feet of water).

* There was one fatal accident as a result of drowning, and two injury accidents.

* Two (40 percent) of the accidents involved alchohol.

- The investigating officers' analysis attributed the accidents to the following driver-related factors: alcohol, speed too fast for conditions, and careless driving.

Accident diagrams are shown on Figure 10-1. Table 10-1 summarizes accident characteristics at the site.

C. EVALUATION

The following factors pertaining to the site were determined from the field survey and accident analysis:

1. Three (50 percent) of the accidents involved westbound vehicles leaving the northeast corner of the bridge and entering the water.

2. Eighty percent of the accidents occurred at night. The east end of the bridge is lighted.

D. RECOMMENDATIONS

The following improvements are recommended for this site:

1. Install W1-1L and W1-1R 30"x30" Turn signs on the southeast and west approaches to the curve. Install a 20 MPH W13-1, 18"x18"

advisory speed plate on the turn sign on the southeast approach and a 15 MPH W13-1, 18"x18" advisory speed plate on the turn sign on the west approach.

2. Add 40 feet of metal guard rail on the northeast end of the existing bridge guardrail.

3. Add two W1-6, 48"x24" large arrow signs on the northeast side of the curve.

4. Install eight reflective guard rail washers on the existing bridge guardrail.

5. Install five 6-foot flexible Design A delineators on the east and west sides of this curve.

The recommended improvements are shown in Figure 10-2.

E. COST

1.	Install W1-1L and W1-1R, 30"x30" Turn signs with 15 MPH and 20 MPH W13-1, 18"x18" advisory speed plates	$280.00
2.	Install 2 W1-6, 48"x24" Large Arrow signs	280.00

3.	Install 40 feet of metal guardrail	320.00
4.	Install eight reflextive guardrail washers	40.00
5.	Install five 6-ft. flexible Design A delineators	120.00
TOTAL:		$1,040.00

F. HAZARD AND PRIORITY INDICES

Based on the information collected and the foregoing analysis, the hazard index for this location is determined to be 58.31. The priority index is 68.48. The calculations are shown in Table 10-2.

ACCIDENT SUMMARY

SITE NUMBER 10 ACCIDENT PERIOD 1984-1987

NUMBER OF ACCIDENTS BY YEAR

1984	1985	1986	1987
2	1	2	

NUMBER OF ACCIDENTS BY DAY OF WEEK

Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
	1	2				2

NUMBER OF ACCIDENTS BY MONTH

Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	1	2			1						1

-- AM -- NUMBER OF ACCIDENTS BY TIME OF DAY -- PM --

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1																1				1	1	1	

NUMBER OF ACCIDENTS BY LIGHT CONDITIONS

Day-light	Dark	Dawn	Dusk
1	4		

NUMBER OF ACCIDENTS BY ROAD CONDITIONS

Dry	Wet	Snow	Ice	Other
4			1	

NUMBER OF ACCIDENTS BY WEATHER CONDITIONS

Clear	Rain	Snow	Fog
3	1		1

NUMBER OF ACCIDENTS BY ACCIDENT TYPE

Angle	Turn	Rear End	Fixed Object	Ped.	Animal	Side-swipe	Non-Col	Head-on	Backing
			2				2	1	

NUMBER OF ACCIDENTS BY POSSIBLE VIOLATION

No Violat.	Drinking	Reckless Driving	Speed	Right-of-Way	Improper Passing	Improper Backing	Improper Turning	Other
1	2	1	1					

NUMBER OF ACCIDENTS BY SEVERITY

	1984	1985	1986	1987
Injury	1	1		
Fatality	1			
Property Dam. Only	1		1	

NUMBER OF ACCIDENTS ALCOHOL INVOLVED

2

HAZARD INDEX CALCULATION

Site Number 10 Date 10/15/88

Site Description Lake Helena Drive - Lake Helena Causeway

Indicator	Data Value		Indicator Value		Weight		Partial H.I.'s
Number of Accidents	1.25	acc/yr	27	X	0.164	=	4.43
Accident Rate	12.50	acc/MVE	100	X	0.225	=	22.50
Accident Severity	$13,840	dollars	71	X	0.191	=	13.56
Volume/Capacity Ratio	.07		20	X	0.082	=	1.64
Sight Distance Ratio	2.0	(wt.ave.)		X	0.074 0	=	-
Driver Expectancy	4.3	(wt.ave.)	70	X	0.149	=	10.43
Information System Deficiencies	3.0	(wt.ave.)	50	X	0.115	=	5.75

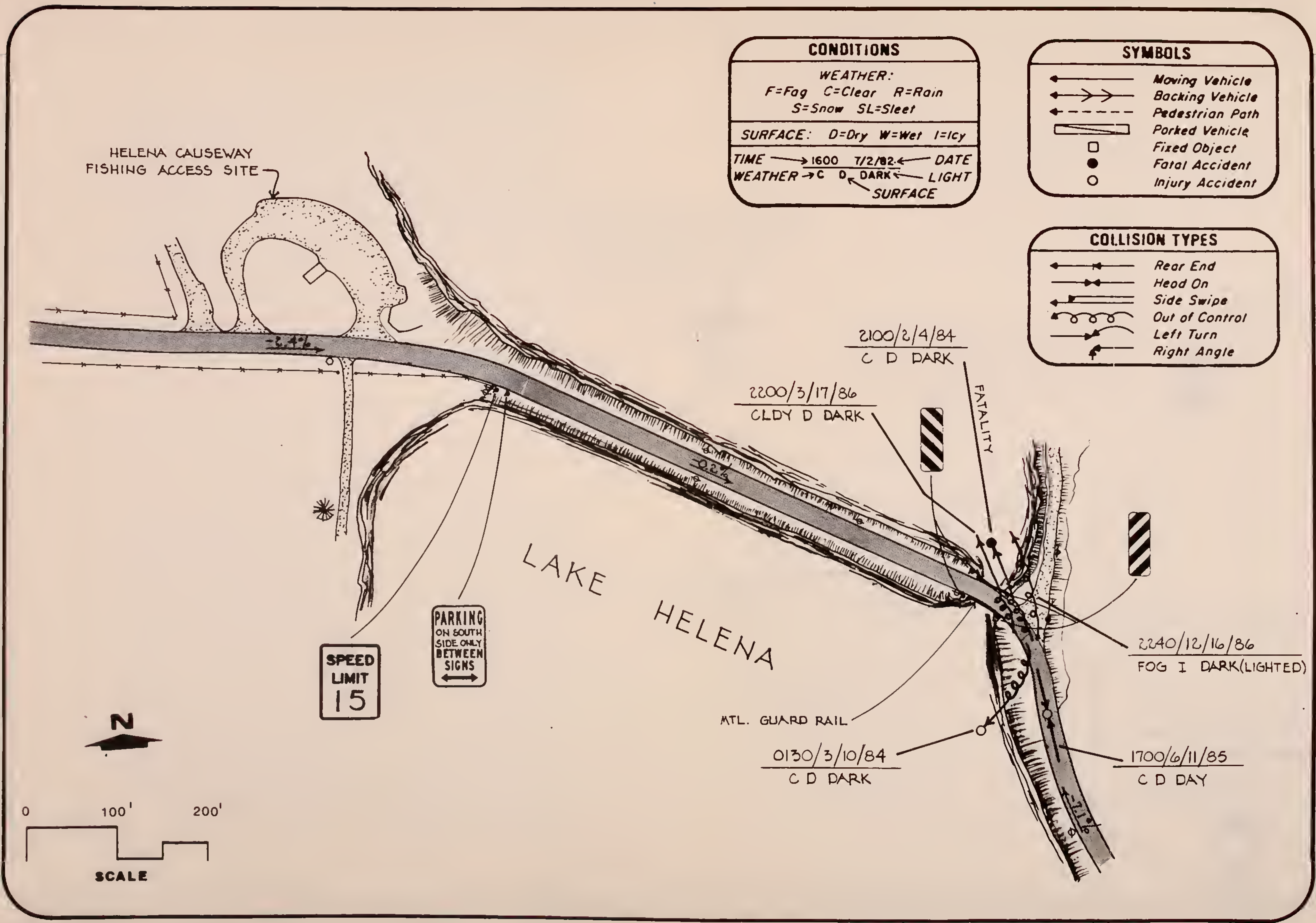
Hazard Index: 58.31

Cost of Recommended Improvements: $1,040.00

Cost Factor: 99

Priority Index = Hazard Index X .75 + Cost Factor X .25

58.31 X .75 + 99 X .25 = 68.48



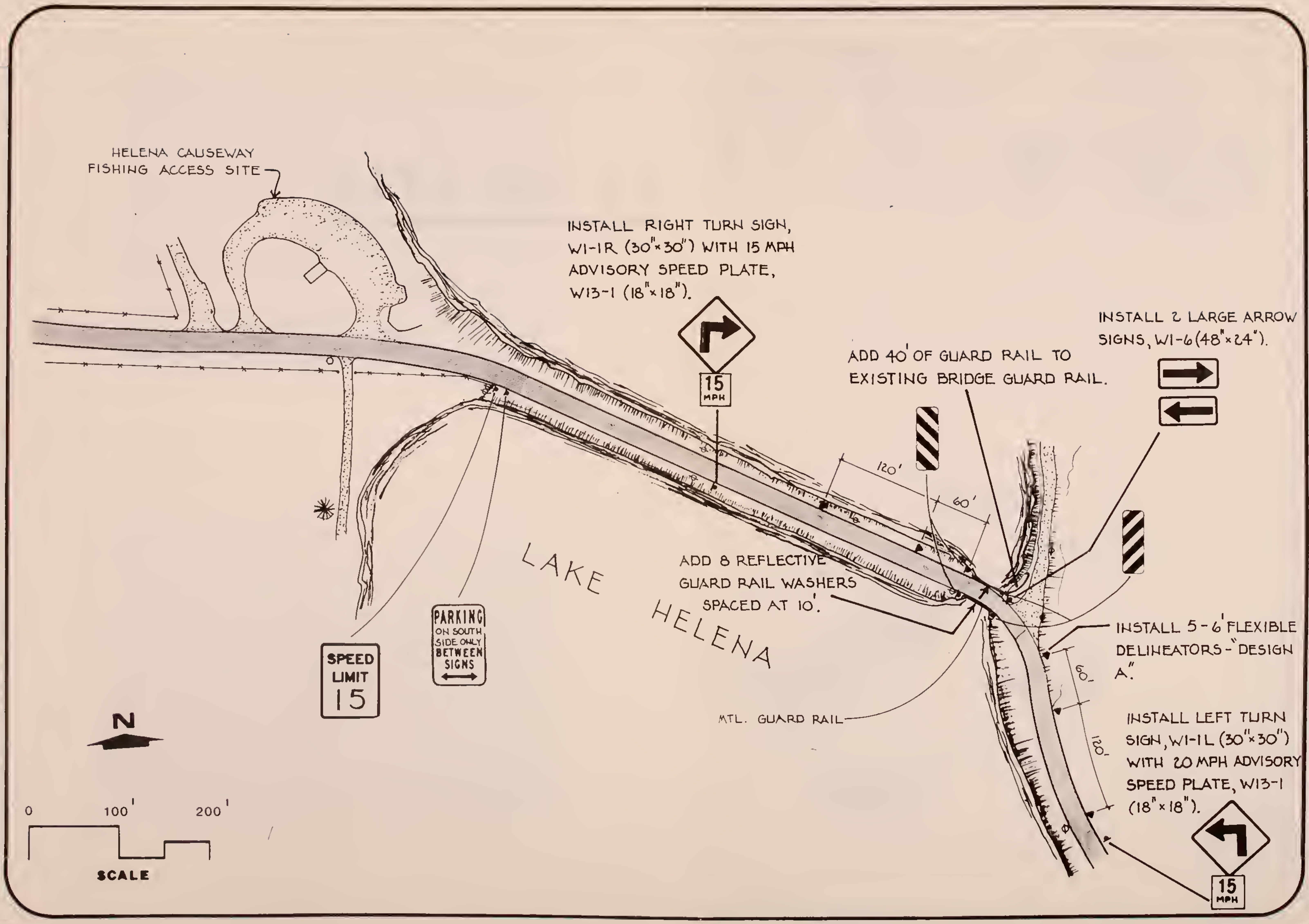
Existing Conditions & Accidents

Lake Helena Drive–Causeway Bridge

SITE NO. 10

Lewis & Clark County

Fig. No. 10–1


HELENA CAUSEWAY
FISHING ACCESS SITE
INSTALL RIGHT TURN SIGN, W1-1R (30"×30") WITH 15 MPH ADVISORY SPEED PLATE, W13-1 (18"×18").
15 MPH
INSTALL 2 LARGE ARROW SIGNS, W1-6 (48"×24").
ADD 40' OF GUARD RAIL TO EXISTING BRIDGE GUARD RAIL.
120'
60'
ADD 8 REFLECTIVE GUARD RAIL WASHERS SPACED AT 10'.
LAKE HELENA
INSTALL 5 - 6' FLEXIBLE DELINEATORS - "DESIGN A."
60'
120'
MTL. GUARD RAIL
INSTALL LEFT TURN SIGN, W1-1L (30"×30") WITH 20 MPH ADVISORY SPEED PLATE, W13-1 (18"×18").
15 MPH
SPEED LIMIT 15
PARKING ON SOUTH SIDE ONLY BETWEEN SIGNS
N
0
100'
200'
SCALE

SITE NO. 10

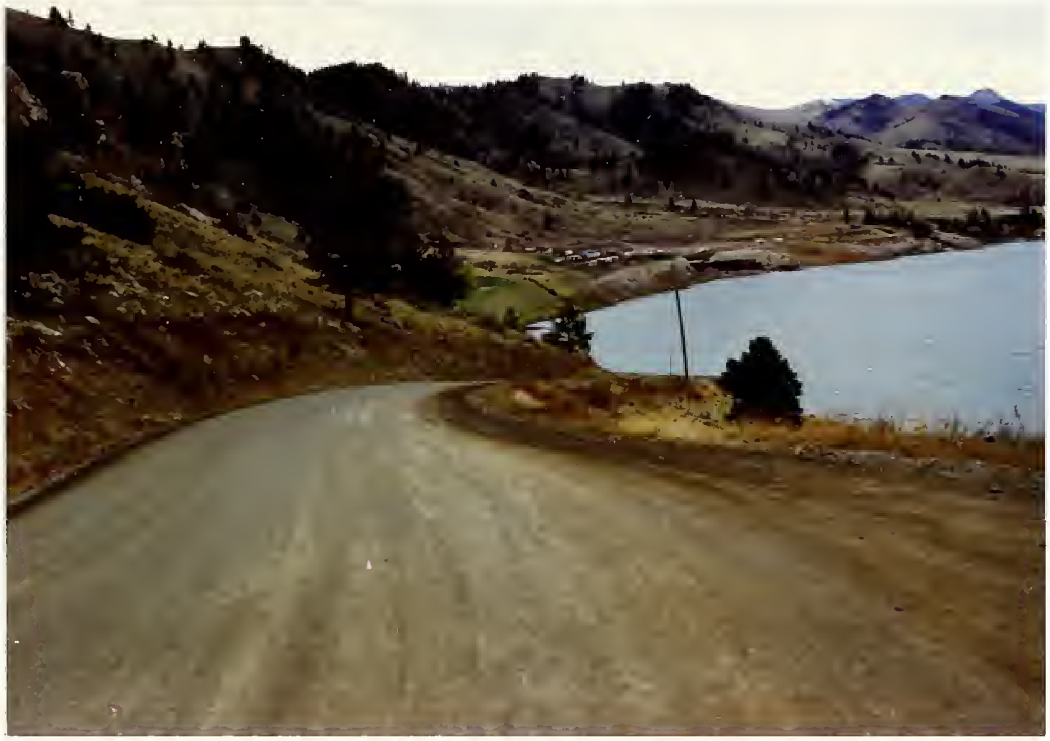
Lewis & Clark County

Recommended Improvements

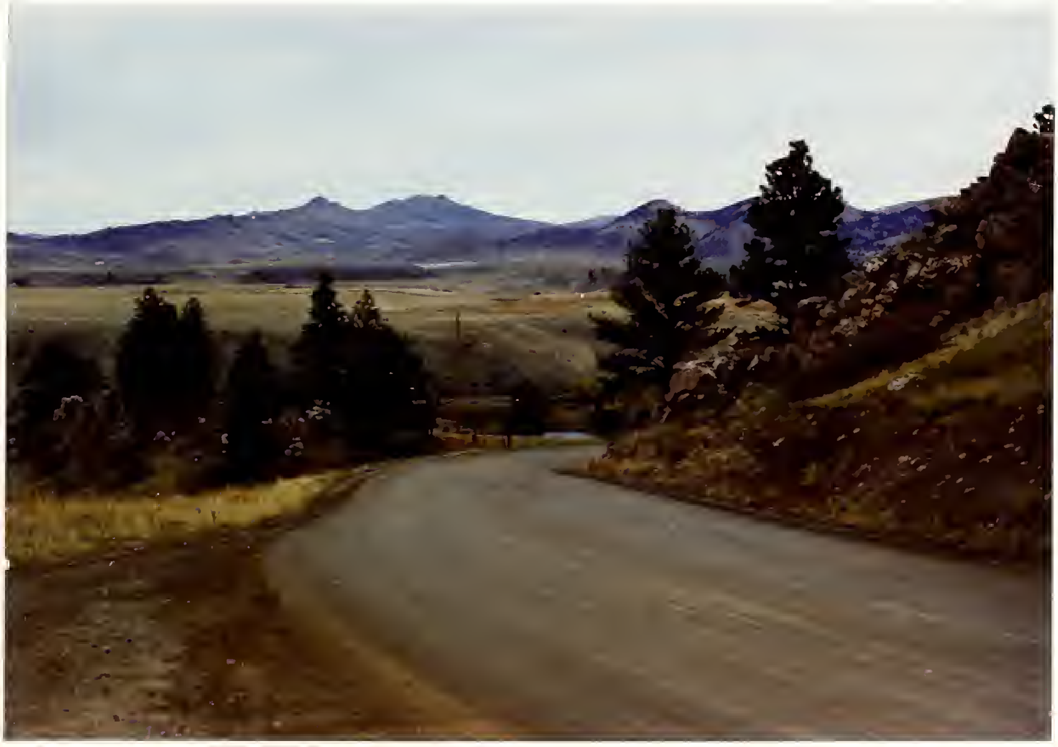
Lake Helena Drive-Causeway Bridge

Fig. No.
10-2

SITE NO. 11



Site 11 - Southeast Approach



Site 11 - Northwest Approach

SITE NO. 11

BEARTOOTH ROAD - HILL AND CURVE

A. DESCRIPTION

This site is a curve located on Beartooth Road approximately 1.9 miles southeast of the I-15 frontage road. The site is located in Section 4, Range 3W, Township 14N. The location consists of a steep hill and sharp curves.

Beartooth Road provides access to recreational facilities located along the northeast side of Holter Lake. The road is heavily traveled by recreational vehicles and vehicles towing boats.

Traffic volumes on this road reach their peak in July when the average daily traffic is nearly double the annual average daily traffic. The 1988 average daily traffic at this location is 180 vpd.

The existing site characteristics are shown on Figure 11-1.

B. ACCIDENT ANALYSIS

Five accidents occurred at this site during the four-year period from 1984 through 1987. The following is a summary of characteristics that are pertinent in determining factors that may have contributed to the accidents:

* Three (60 percent) of the accidents occurred on weekends.

* Three (60 percent) of the accidents occurred during daylight hours.

* All of the accidents occurred when the road was dry.

* Four (80 percent) of the accidents involved single vehicles leaving the road.

* Two (40 percent) of the accidents resulted in injuries.

* The investigating officers' analysis attributed the accidents to the following driver-related factors: careless driving, and speed too fast for conditions.

Accident diagrams are shown on Figure 11-1. Table 11-1 summarizes accident characteristics at the site.

C. EVALUATION

The following factors pertaining to the site were determined from the field survey and accident analysis:

1. Three of the five accidents at this site involved northwest-bound vehicles leaving the road on the southeast curve.
2. The curve was ball-banked at 15 mph.
3. The curve is located on the crest of a hill. Vehicles leaving the road were headed uphill.

D. RECOMMENDATIONS

The following improvements are recommended for this site:

1. Install 17 six-foot flexible Design A delinators on the curves as shown in Figure 11-2.
2. Install two W1-6, 48"x24" Large Arrows on curve.
3. Install a W1-1L, 30"x30" Left Turn sign with a 15 mph W13-1, 18"x18" advisory speed plate on the north approach.

4. Install a W1-3R, 30"x30" Reverse Turn Right sign with a 15 mph W13-1, 18"x18" advisory speed plate on the east approach.

The recommended improvements are shown in Figure 11-2.

E. COST

1.	Install 17 6-ft. flexible Design A delineators	$340.00
2.	Install 2 W1-6, 48"x24" Large Arrow signs	280.00
3.	Install W1-1L, 30"x30" Left Turn sign with 15 mph W13-1, 18"x18" advisory speed plate	140.00
4.	Install W1-3R, 30"x30" Reverse Turn Right sign with a 15 MPH W13-1, 18"x18" advisory speed plate	140.00
TOTAL COST:		$900.00

F. HAZARD AND PRIORITY INDICES

Based on the information collected and the foregoing analysis, the hazard index for this location is determined to be 68.72. The priority index is 74.54. The calculations are shown in Table 11-2.

ACCIDENT SUMMARY

SITE NUMBER 11 ACCIDENT PERIOD 1984-1987

NUMBER OF ACCIDENTS BY YEAR

1984	1985	1986	1987
1	2	1	1

NUMBER OF ACCIDENTS BY DAY OF WEEK

Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
2			2			1

NUMBER OF ACCIDENTS BY MONTH

Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
				1	1		2			1	

NUMBER OF ACCIDENTS BY TIME OF DAY

-- AM -- -- PM --

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1		1				1						1	1										

NUMBER OF ACCIDENTS BY LIGHT CONDITIONS

Day-light	Dark	Dawn	Dusk
3	1		

NUMBER OF ACCIDENTS BY ROAD CONDITIONS

Dry	Wet	Snow	Ice	Other
5				

NUMBER OF ACCIDENTS BY WEATHER CONDITIONS

Clear	Rain	Snow	Fog
5			

NUMBER OF ACCIDENTS BY ACCIDENT TYPE

Angle	Turn	Rear End	Fixed Object	Ped.	Animal	Side-swipe	Non-Col	Head-on	Backing
			1				3	1	

NUMBER OF ACCIDENTS BY POSSIBLE VIOLATION

No Violat.	Drinking	Reckless Driving	Speed	Right-of-Way	Improper Passing	Improper Backing	Improper Turning	Other
1		3	1					

NUMBER OF ACCIDENTS BY SEVERITY

	1984	1985	1986	1987
Injury	1			1
Fatality				
Property Dam. Only		2	1	

NUMBER OF ACCIDENTS ALCOHOL INVOLVED

0

HAZARD INDEX CALCULATION

Site Number 11 **Date** 10/15/88

Site Description Beartooth Road - Hill and Curve

Indicator	**Data Value**		**Indicator Value**		**Weight**		**Partial H.I.'s**
Number of Accidents	1.25	acc/yr	31	X	0.164	=	5.08
Accident Rate	19.02	acc/MVE	100	X	0.225	=	22.50
Accident Severity	$13,840	dollars	71	X	0.191	=	13.56
Volume/Capacity Ratio	.04		15	X	0.082	=	1.23
Sight Distance Ratio	< .5	(wt.ave.)	100	X	0.074	=	7.40
Driver Expectancy	3.5	(wt.ave.)	57	X	0.149	=	8.49
Information System Deficiencies	5.5	(wt.ave.)	91	X	0.115	=	10.46

Hazard Index: 68.72

Cost of Recommended Improvements: $900.00

Cost Factor: 92

Priority Index = Hazard Index X .75 + Cost Factor X .25

68.72 X .75 + 92 X .25 = 74.54

SITE NO. 11

Lewis & Clark County

Existing Conditions & Accidents

Beartooth Road-Hill & Curve

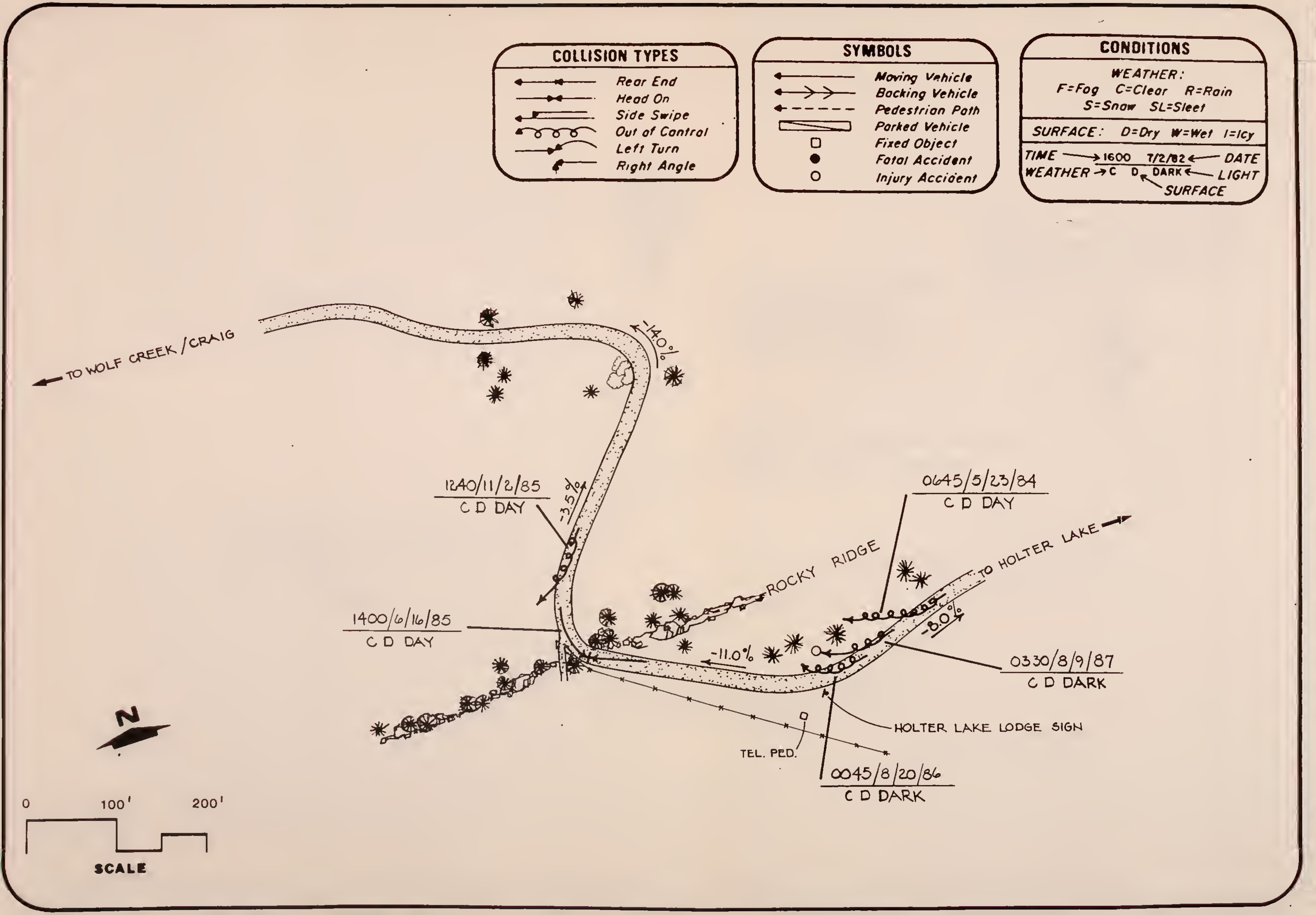


Fig. No.
11-1

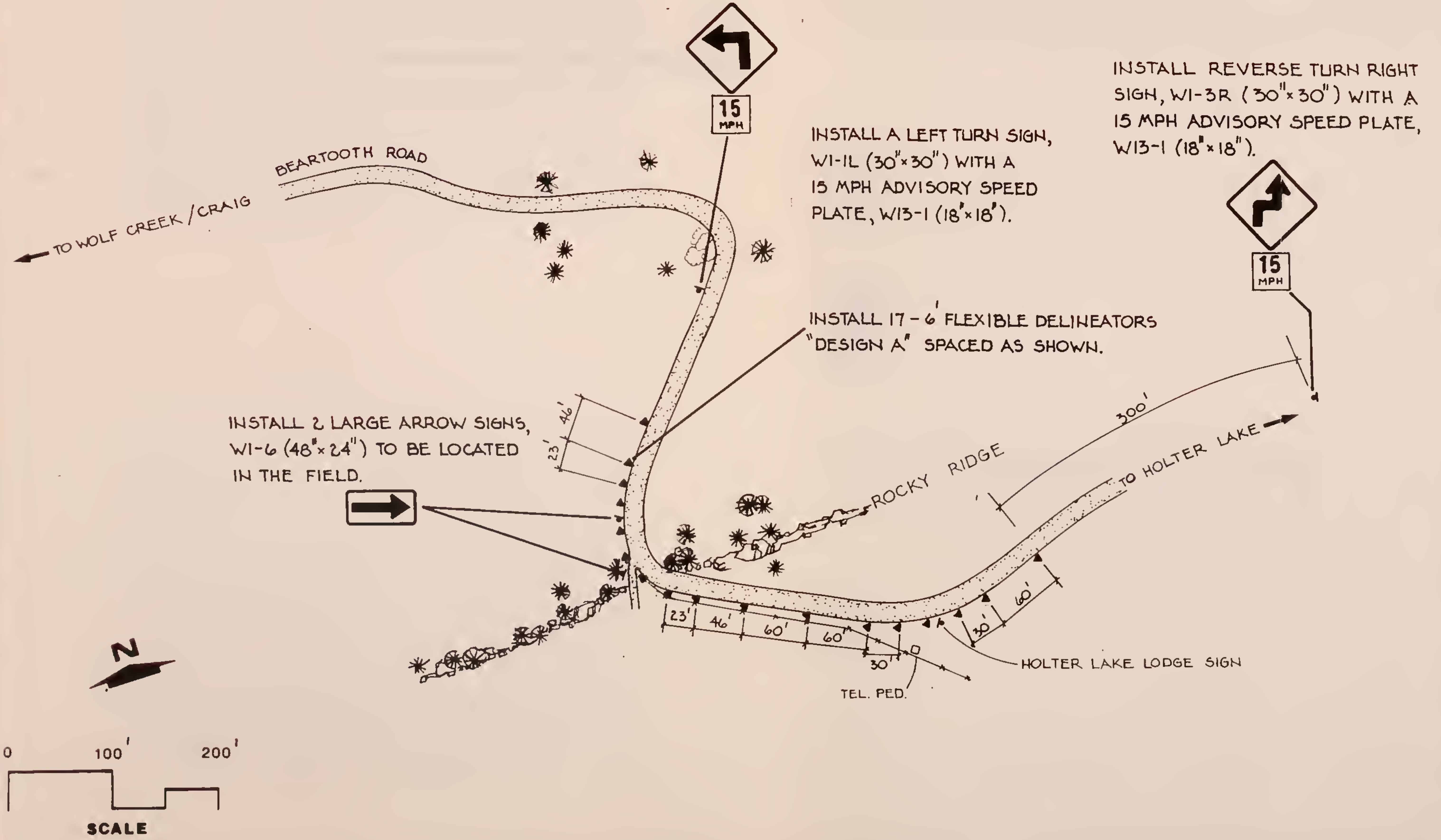
Recommended Improvements

Beartooth Road-Hill & Curve

SITE NO. 11

Lewis & Clark County

Fig. No.
11-2



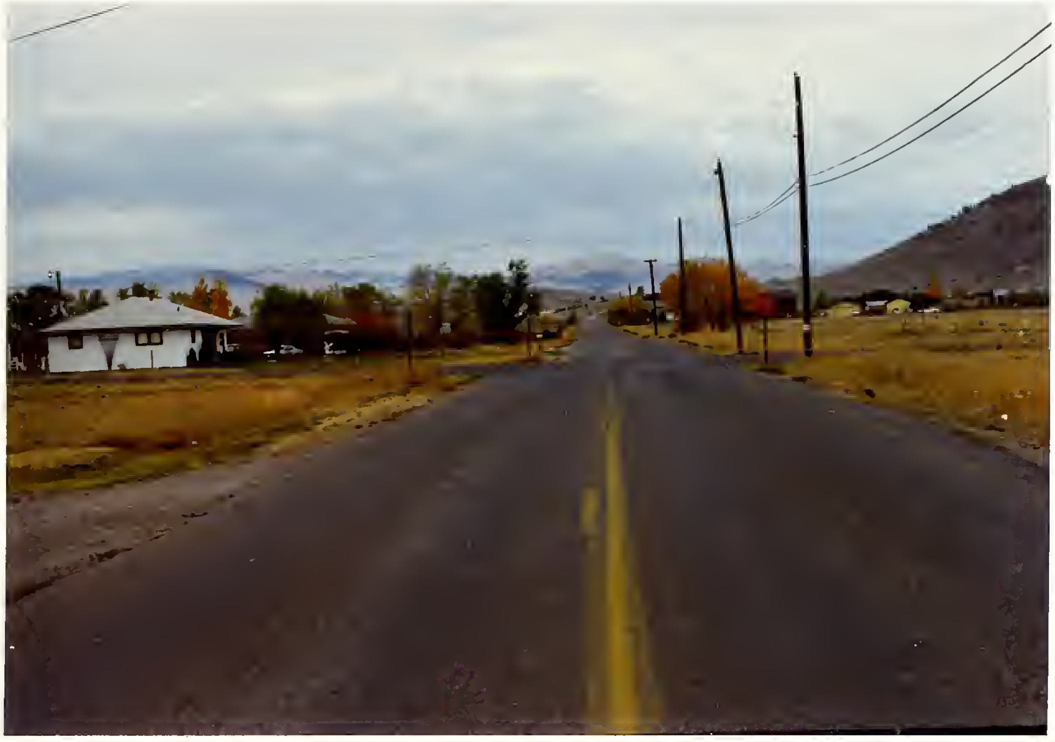
INSTALL A LEFT TURN SIGN, W1-1L (30"×30") WITH A 15 MPH ADVISORY SPEED PLATE, W13-1 (18'×18').

INSTALL REVERSE TURN RIGHT SIGN, W1-3R (30"×30") WITH A 15 MPH ADVISORY SPEED PLATE, W13-1 (18"×18").

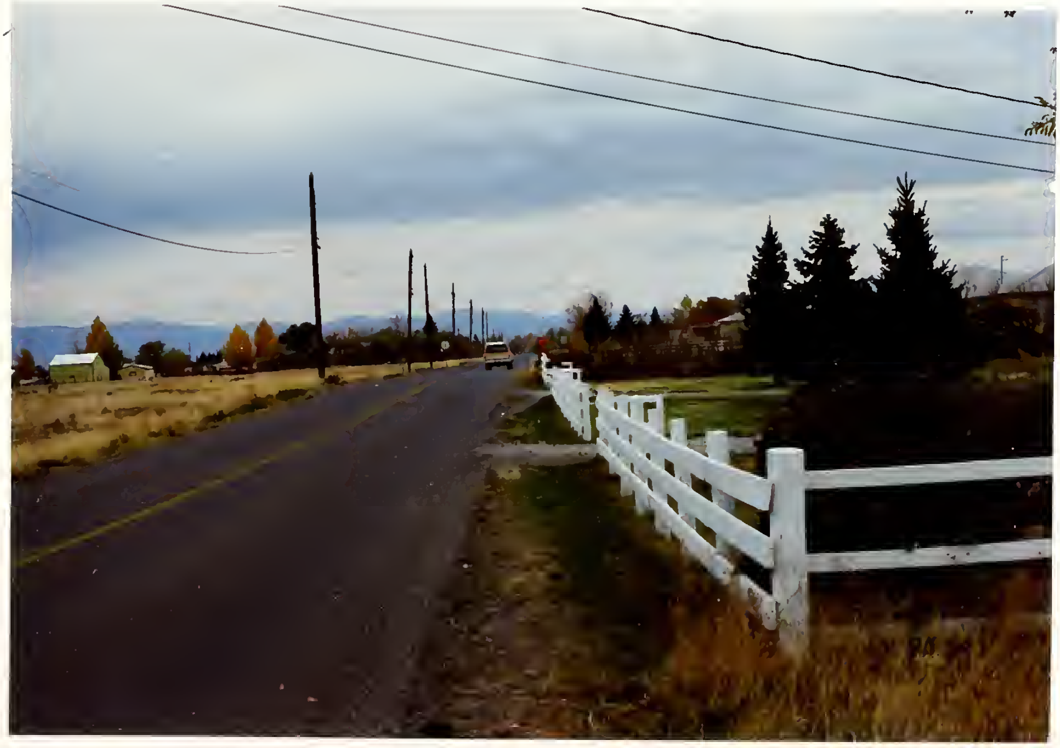
INSTALL 17 – 6' FLEXIBLE DELINEATORS "DESIGN A" SPACED AS SHOWN.

INSTALL 2 LARGE ARROW SIGNS, W1-6 (48"×24") TO BE LOCATED IN THE FIELD.

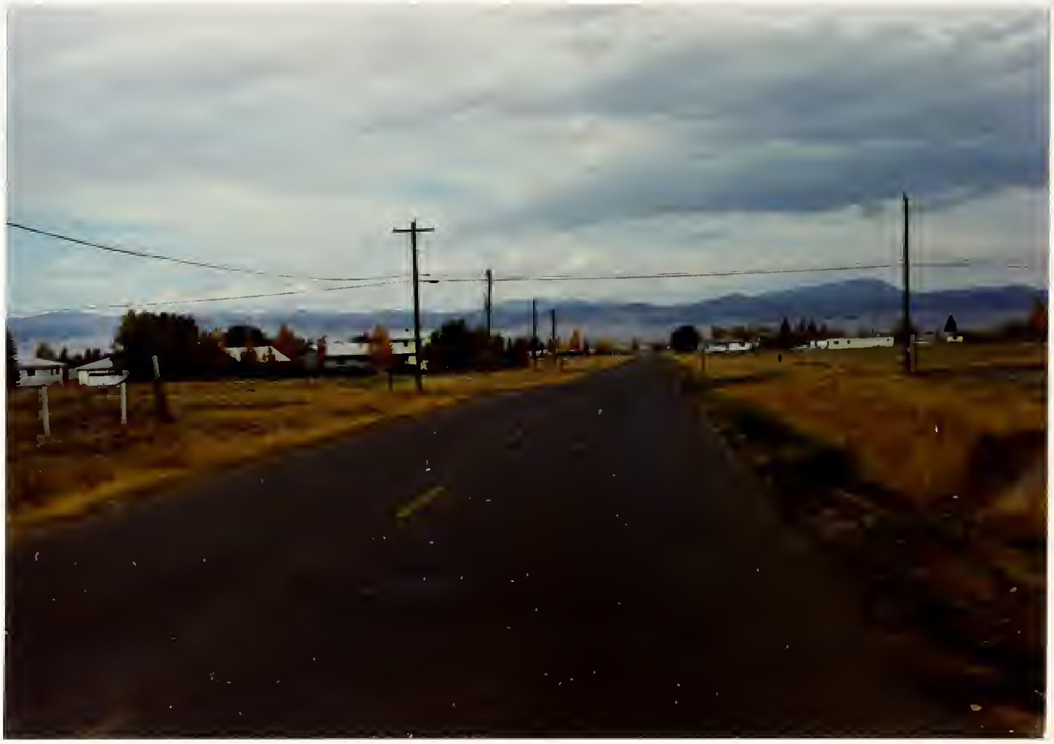
SITE NO. 12



Site 12 - East Approach



Site 12 - West Approach



Site 12 - South Approach

SITE NO. 12

McHUGH DRIVE AND MILL ROAD

A. DESCRIPTION

This site is located approximately two miles north of the north Helena city limits at the intersection of McHugh Drive and Mill Road. Both roads are paved. The east and west legs (Mill Road) of the intersection are controlled by STOP signs.

McHugh Drive is a major connecting route between the Helena valley and City of Helena. Mill Road provides one of two connections between North Montana Avenue and Green Meadow Drive.

The 1988 average daily traffic volumes at this site are as follows:

Leg	ADT
North	905
South	1,275
East	920
West	430

The existing site characteristics are shown on Figure 12-1.

B. ACCIDENT ANALYSIS

Five accidents occurred at this site during the four-year period from 1984 through 1987. The following is a summary of characteristics that are pertinent in determining factors that may have contributed to the accidents:

* All of the accidents occurred on weekdays.
* Three (60 percent) of the accidents occurred during daylight hours.
* Four (80 percent) of the accidents occurred on a dry road.
* Four (80 percent) of the accidents were angle collisions between two vehicles.
* Three (60 percent) of the accidents involved failure to yield right-of-way.
* Three (60 percent) of the accidents occurred in the past two years.

- Four (80 percent of the accidents involved vehicles on Mill Road failing to stop at McHugh Lane.

Accident diagrams are shown on Figure 12-1. Table 12-1 summarizes accident characteristics at the site.

C. EVALUATION

The following factors pertaining to the site were determined from the field survey and accident analysis:

1. Four of the five accidents involved vehicles running the STOP sign on the east leg of the intersection.
2. Road surface and time of day are not major factors in the cause of accidents at this location.

D. RECOMMENDATIONS

The following improvements are recommended for this site:

1. Install W3-1a, 36"x36" STOP AHEAD signs on the east and west approaches.

2. Install W2-1, 30"x30" CROSS ROAD signs on the north and south approaches.

3. Install four Design D approach delineators on the east and west approaches.

The recommended improvements are shown in Figure 12-2.

E. COST

1.	Install 2 W3-1a, 36"x36" STOP AHEAD signs	$280.00
2.	Install 2 W2-1, 30"x30" CROSS ROAD signs	280.00
3.	Install 4 Design D approach delineators	40.00
TOTAL COST		$600.00

F. HAZARD AND PRIORITY INDICES

Based on the information collected and the foregoing analysis, the hazard index for this location is determined to be 47.13. The priority index is 60.10. The calculations are shown in Table 12-2.

ACCIDENT SUMMARY

SITE NUMBER 12

ACCIDENT PERIOD 1984-1987

NUMBER OF ACCIDENTS BY YEAR

1984	1985	1986	1987
1	1	1	2

NUMBER OF ACCIDENTS BY DAY OF WEEK

Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
	2	1	1		1	

NUMBER OF ACCIDENTS BY MONTH

Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
2			1		1						1

-- AM -- NUMBER OF ACCIDENTS BY TIME OF DAY -- PM --

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
						1					1	1						1	1				

NUMBER OF ACCIDENTS BY LIGHT CONDITIONS

Day-light	Dark	Dawn	Dusk
3	1		1

NUMBER OF ACCIDENTS BY ROAD CONDITIONS

Dry	Wet	Snow	Ice	Other
4			1	

NUMBER OF ACCIDENTS BY WEATHER CONDITIONS

Clear	Rain	Snow	Fog
4	1		

NUMBER OF ACCIDENTS BY ACCIDENT TYPE

Angle	Turn	Rear End	Fixed Object	Ped.	Animal	Side-swipe	Non-Col	Head-on	Backing
4	1								

NUMBER OF ACCIDENTS BY POSSIBLE VIOLATION

No Violat.	Drinkin	Reckless Driving	Speed	Right-of-Way	Improper Passing	Imprope Backing	Imprope Turning	Other
1				4				

NUMBER OF ACCIDENTS BY SEVERITY

	1984	1985	1986	1987
Injury			1	1
Fatality				
Property Dam. Only	1	1		1

NUMBER OF ACCIDENTS ALCOHOL INVOLVED

0

HAZARD INDEX CALCULATION

Site Number 12 **Date** 10/15/88

Site Description McHugh Drive - Mill Road

Indicator	Data Value		Indicator Value		Weight		Partial H.I.'s
Number of Accidents	1.25	acc/yr	31	X	0.164	=	5.08
Accident Rate	1.94	acc/MVE	31	X	0.225	=	6.98
Accident Severity	$12,540	dollars	70	X	0.191	=	13.37
Volume/Capacity Ratio	0.22		40	X	0.082	=	3.28
Sight Distance Ratio	1.5	(wt.ave.)	10	X	0.074	=	0.74
Driver Expectancy	4.0	(wt.ave.)	67	X	0.149	=	9.98
Information System Deficiencies	4.0	(wt.ave.)	67	X	0.115	=	7.70

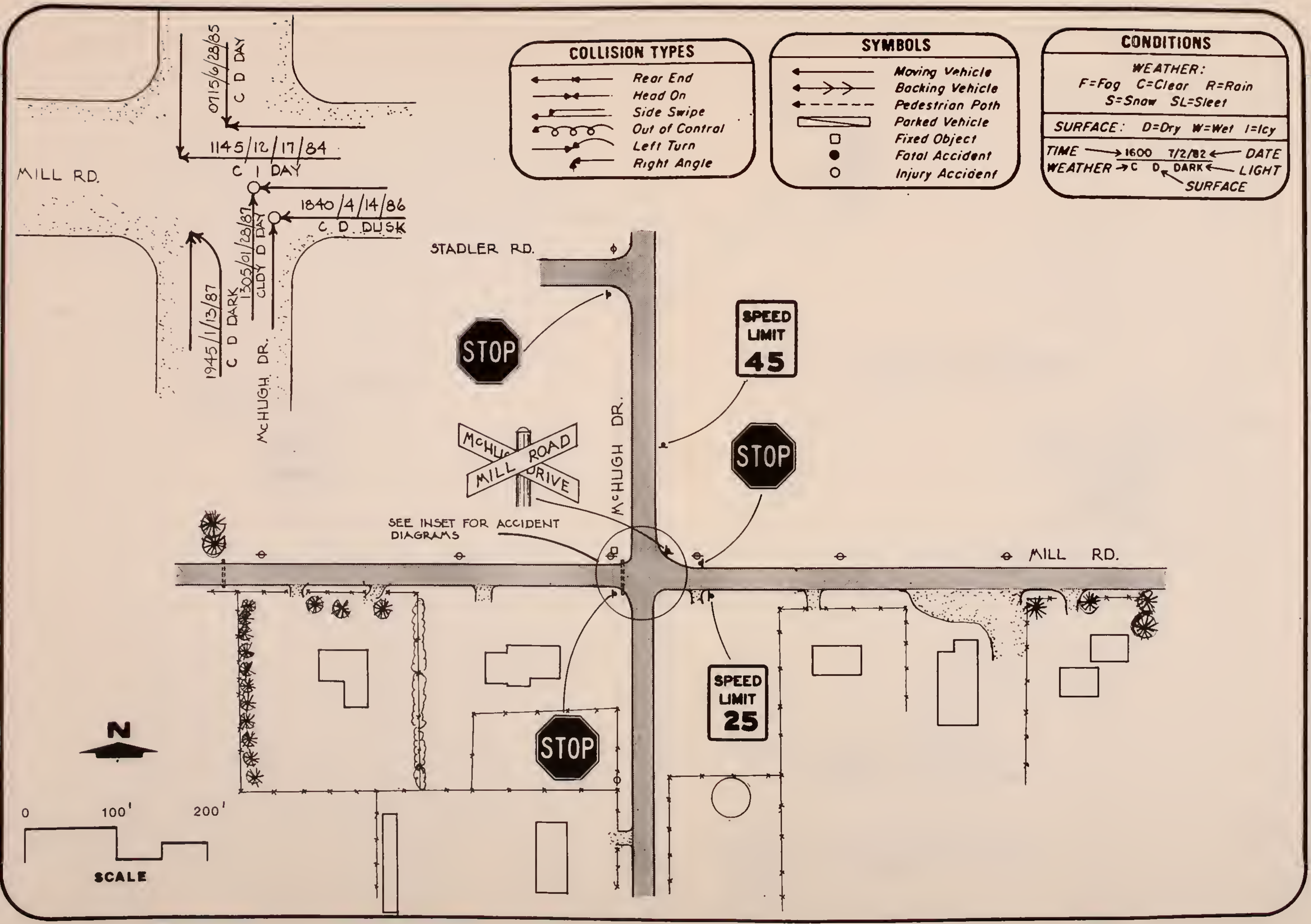
Hazard Index: 47.13

Cost of Recommended Improvements: $600.00

Cost Factor: 99

Priority Index = Hazard Index X .75 + Cost Factor X .25

47.13 X .75 + 99 X .25 = 60.10



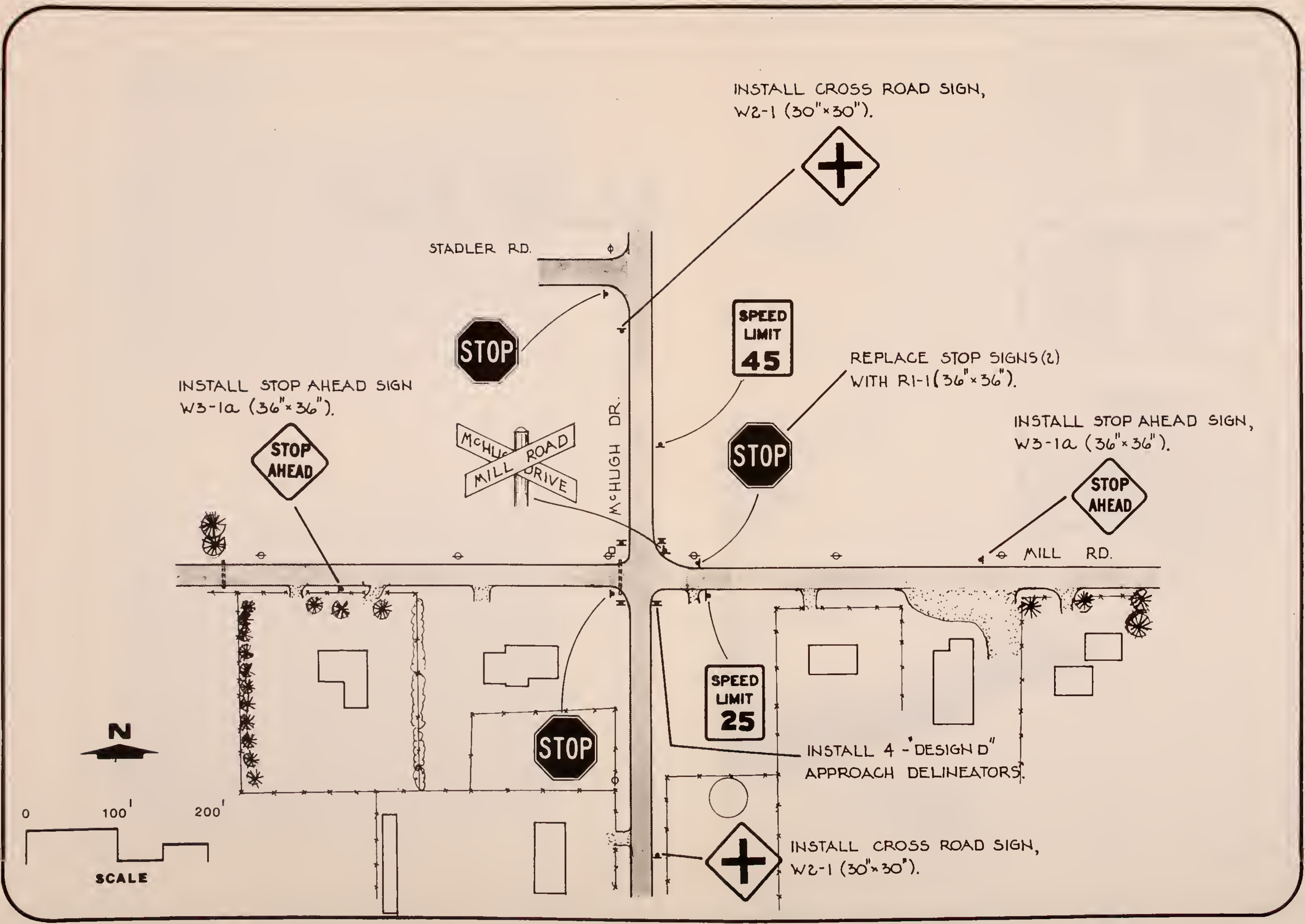
SITE NO. 12

Lewis & Clark County

Existing Conditions & Accidents

McHugh Drive-Mill Road

Fig. No.
12-1



INSTALL CROSS ROAD SIGN, W2-1 (30"×30").

REPLACE STOP SIGNS (2) WITH R1-1 (36"×36").

INSTALL STOP AHEAD SIGN W3-1a (36"×36").

INSTALL STOP AHEAD SIGN, W3-1a (36"×36").

INSTALL 4 - "DESIGN D" APPROACH DELINEATORS.

INSTALL CROSS ROAD SIGN, W2-1 (30"×30").

Recommended Improvements

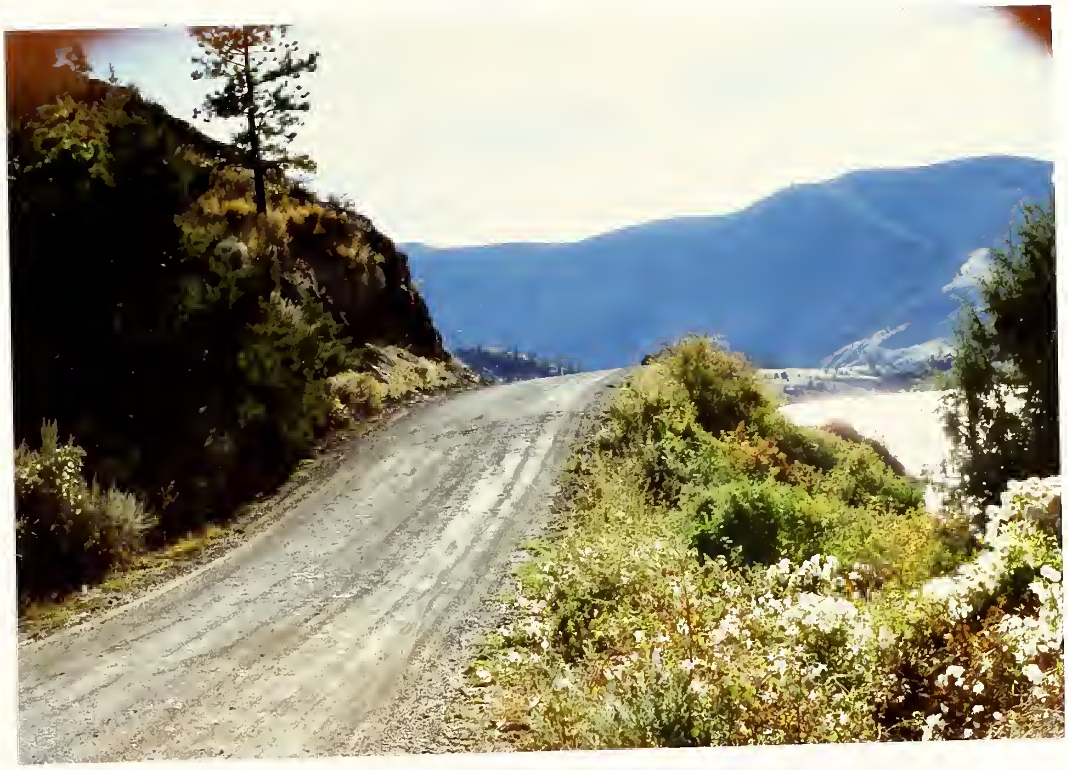
McHugh Drive-Mill Road

SITE NO. 12

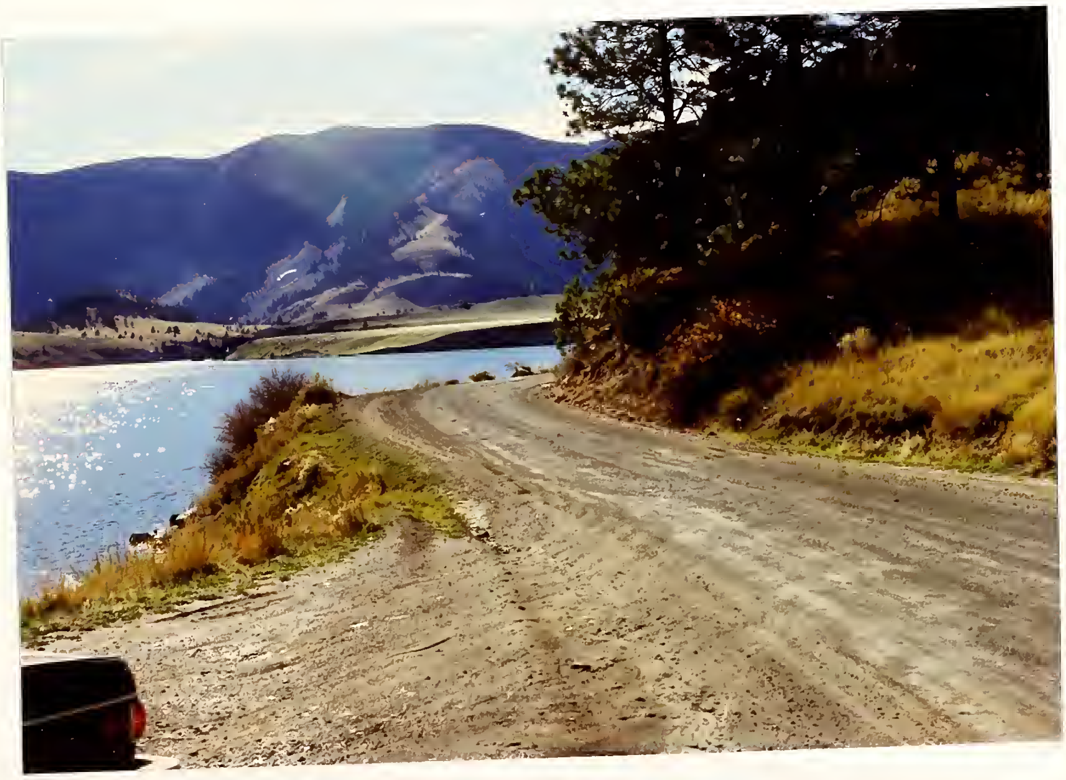
Lewis & Clark County

Fig. No.
12-2

SITE NO.13



Site 13 - Southeast Approach



Site 13 - Northwest Approach

SITE NO. 13

BEARTOOTH ROAD - CURVES

A. DESCRIPTION

This site is located on Beartooth Road approximately 6.0 miles southeast of the I-15 frontage road at the Beartooth State Recreation area. The site is in Section 22, Range 3W, Township 14N. The road surface is gravel. During the summer months, the areas adjacent to the road are heavily used recreational areas for camping and boating. Traffic volumes are probably in the 1,000 to 1,500 vpd range. Averaged over the year, the 1988 Average Daily Traffic is 180 vpd.

The existing site characteristics are shown on Figure 13-1.

B. ACCIDENT ANALYSIS

Four accidents occurred at this site during the four-year period from 1984 through 1987. The following is a summary of characteristics that are pertinent in determining factors that may have contributed to the accidents:

* Three (75 percent) of the accidents occurred on weekdays.

- Three (75 percent) of the accidents occurred during daylight hours.
- Three (75 percent) of the accidents occurred on a dry road.
- Three (75 percent) of the accidents involved single vehicles leaving the road.
- Two (50 percent) of the accidents occurred during the past two years.
- Three (75 percent) of the accidents were attributed to speed too fast for conditions.

Accident diagrams are shown on Figure 13-1. Table 13-1 summarizes accident characteristics at the site.

C. EVALUATION

The following factors pertaining to the site were determined from the field survey and accident analysis:

1. All of the accidents occurred on the two curves southeast of the recreation area.

2. Three of the four accidents occurred during months when boaters and campers were using the recreation area. The fourth accident occurred during hunting season.

3. The curves were ball-banked at 15 MPH.

D. RECOMMENDATIONS

The following improvements are recommended for this site:

1. Install W1-1R, 30"x30" TURN RIGHT signs with 15 MPH W13-1, 18"x18" Advisory Speed plates on the east and west approaches to the site.

2. Install two W1-6, 48"x24" Large Arrow signs on the northwest curve. The exact location is to be determined in the field at the time of installation.

3. Install two W1-6, 48"x24" Large Arrow signs on the southeast curve. The exact location is to be determined in the field at the time of installation.

4. Install seven 6-foot flexible Design A delineators on the northwest curve and eight 6-foot flexible Design A delineators on the southeast curve, spaced as shown on Figure 13-2.

The recommended improvements are shown in Figure 13-2.

E. COST

1.	Install 2 W1-1R, 30"x30" Curve Right signs with 15 MPH W13-1, 18"x18" Advisory Speed plates	$280.00
2.	Install 4 W1-6, 48"x24" Large Arrow signs	560.00
3.	Install 15 6-ft. flexible Design A delinators	300.00
TOTAL COST		$1,140.00

F. HAZARD AND PRIORITY INDICES

Based on the information collected and the foregoing analysis, the hazard index for this location is determined to be 68.66. The priority index is 75.00. The calculations are shown in Table 13-2.

ACCIDENT SUMMARY

SITE NUMBER 13 ACCIDENT PERIOD 1984-1987

NUMBER OF ACCIDENTS BY YEAR

1984	1985	1986	1987
	2	1	1

NUMBER OF ACCIDENTS BY DAY OF WEEK

Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
	1			1	1	1

NUMBER OF ACCIDENTS BY MONTH

Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
					1	1			1	1	

-- AM -- NUMBER OF ACCIDENTS BY TIME OF DAY -- PM --

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
					1										1		1		1				

NUMBER OF ACCIDENTS BY LIGHT CONDITIONS

Day-Light	Dark	Dawn	Dusk
3	1		

NUMBER OF ACCIDENTS BY ROAD CONDITIONS

Dry	Wet	Snow	Ice	Other
3		1		

NUMBER OF ACCIDENTS BY WEATHER CONDITIONS

Clear	Rain	Snow	Fog
3		1	

NUMBER OF ACCIDENTS BY ACCIDENT TYPE

Angle	Turn	Rear End	Fixed Object	Ped.	Animal	Side-swipe	Non-Col	Head-on	Backing
						1	3		

NUMBER OF ACCIDENTS BY POSSIBLE VIOLATION

No Violat.	Drinking	Reckless Driving	Speed	Right-of-Way	Improper Passing	Improper Backing	Improper Turning	Other
1			3					

NUMBER OF ACCIDENTS BY SEVERITY

	1984	1985	1986	1987
Injury		1		
Fatality				
Property Dam. Only		1	1	1

NUMBER OF ACCIDENTS ALCOHOL INVOLVED

0

HAZARD INDEX CALCULATION

Site Number 13 Date 10/15/88

Site Description Beartooth Road - Curve

Indicator	Data Value		Indicator Value		Weight		Partial H.I.'s
Number of Accidents	1.00	acc/yr	28	X	0.164	=	4.59
Accident Rate	15.22	acc/MVE	100	X	0.225	=	22.50
Accident Severity	$14,200	dollars	73	X	0.191	=	13.94
Volume/Capacity Ratio	.04		17	X	0.082	=	1.39
Sight Distance Ratio	≤ .5	(wt.ave.)	100	X	0.074	=	7.40
Driver Expectancy	3.5	(wt.ave.)	57	X	0.149	=	8.49
Information System Deficiencies	5.5	(wt.ave.)	90	X	0.115	=	10.35

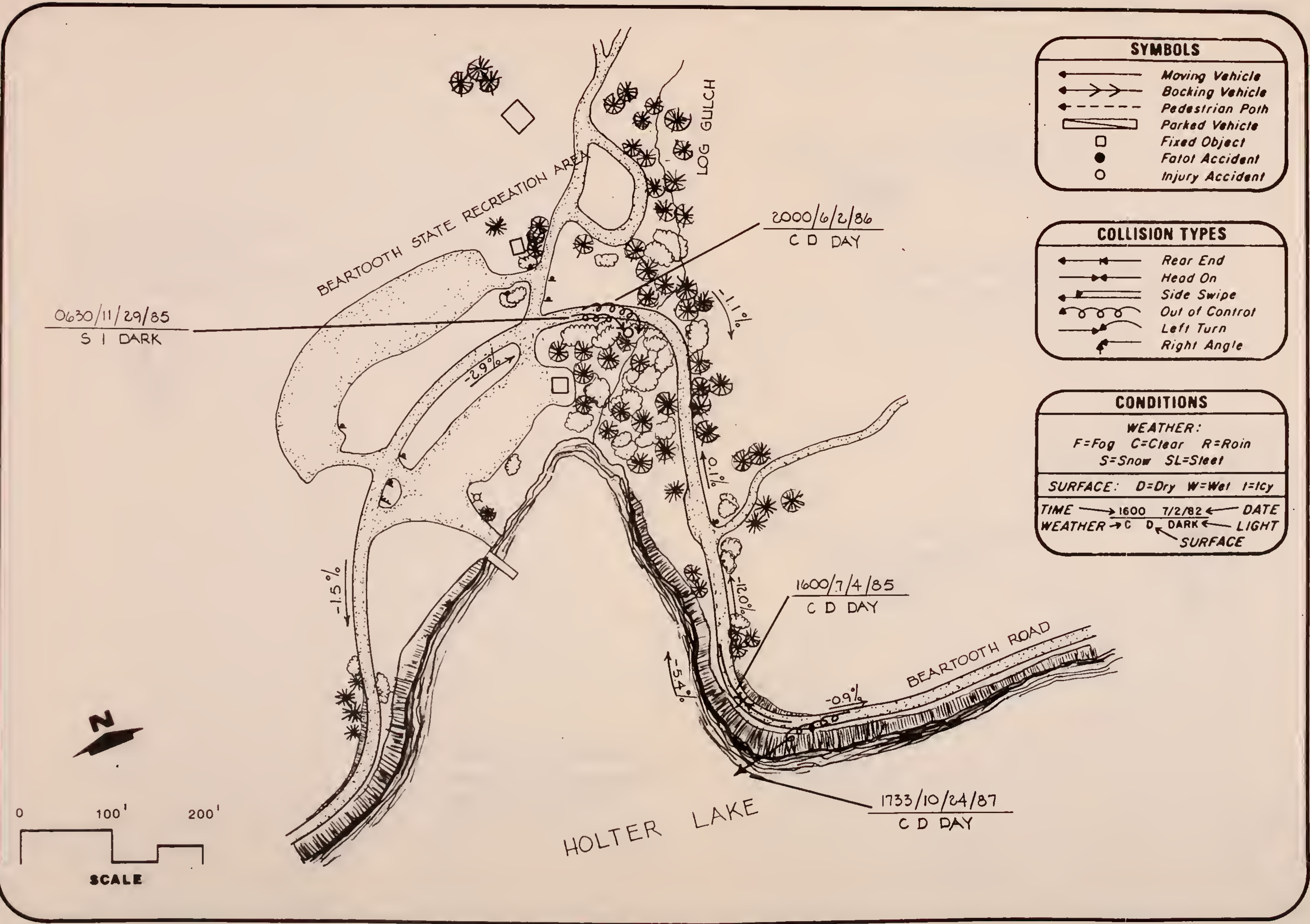
Hazard Index: 68.66

Cost of Recommended Improvements: $1,140.00

Cost Factor: 94

Priority Index = Hazard Index X .75 + Cost Factor X .25

68.66 X .75 + 94 X .25 = 75.00



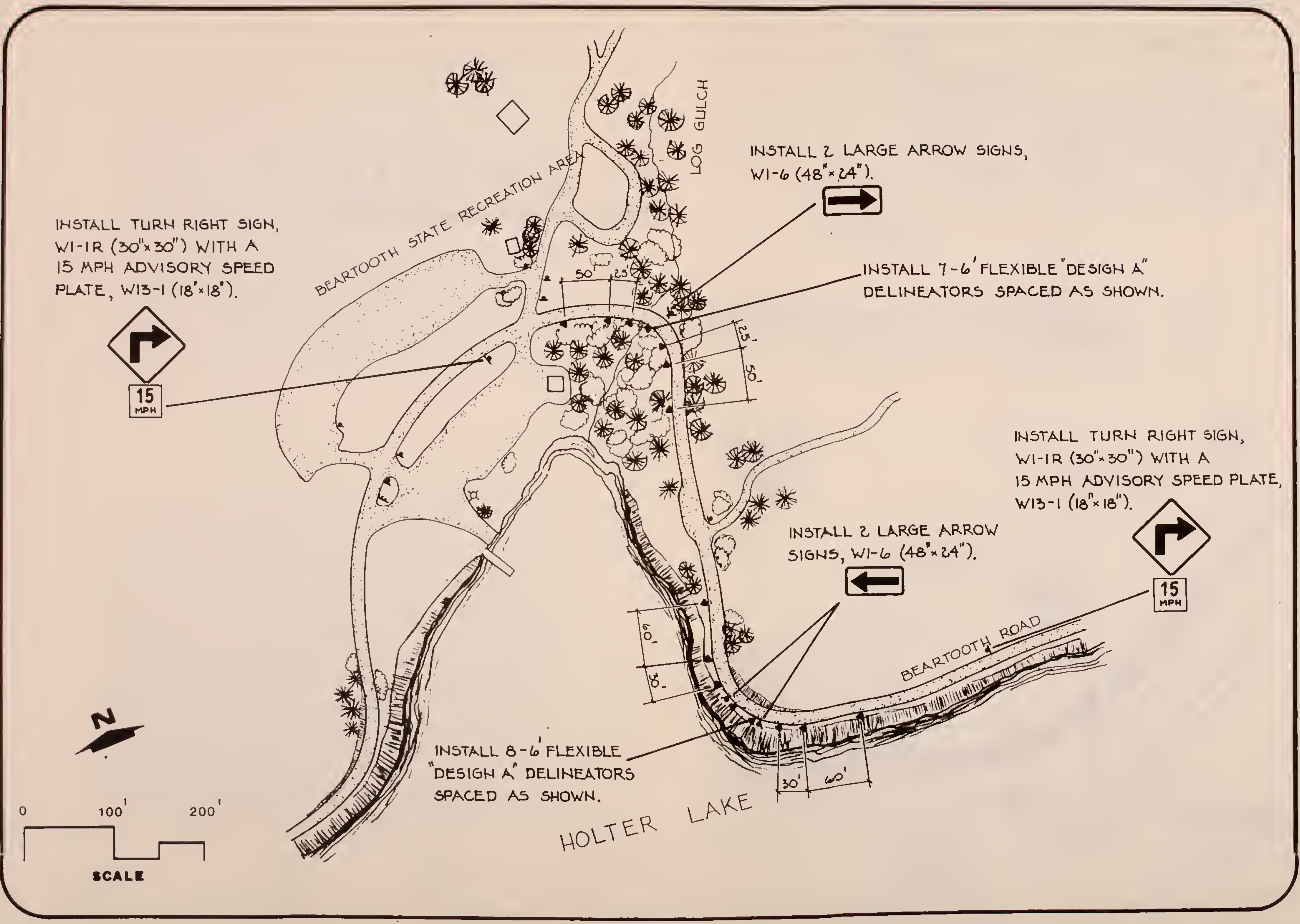
Existing Conditions & Accidents

Beartooth Road-Curve

SITE NO. 13

Lewis & Clark County

Fig. No.
13-1



INSTALL TURN RIGHT SIGN, W1-1R (30"×30") WITH A 15 MPH ADVISORY SPEED PLATE, W13-1 (18"×18").

INSTALL 2 LARGE ARROW SIGNS, W1-6 (48"×24").

INSTALL 7-6' FLEXIBLE "DESIGN A" DELINEATORS SPACED AS SHOWN.

INSTALL TURN RIGHT SIGN, W1-1R (30"×30") WITH A 15 MPH ADVISORY SPEED PLATE, W13-1 (18"×18").

INSTALL 2 LARGE ARROW SIGNS, W1-6 (48"×24").

INSTALL 8-6' FLEXIBLE "DESIGN A" DELINEATORS SPACED AS SHOWN.

SITE NO. 13

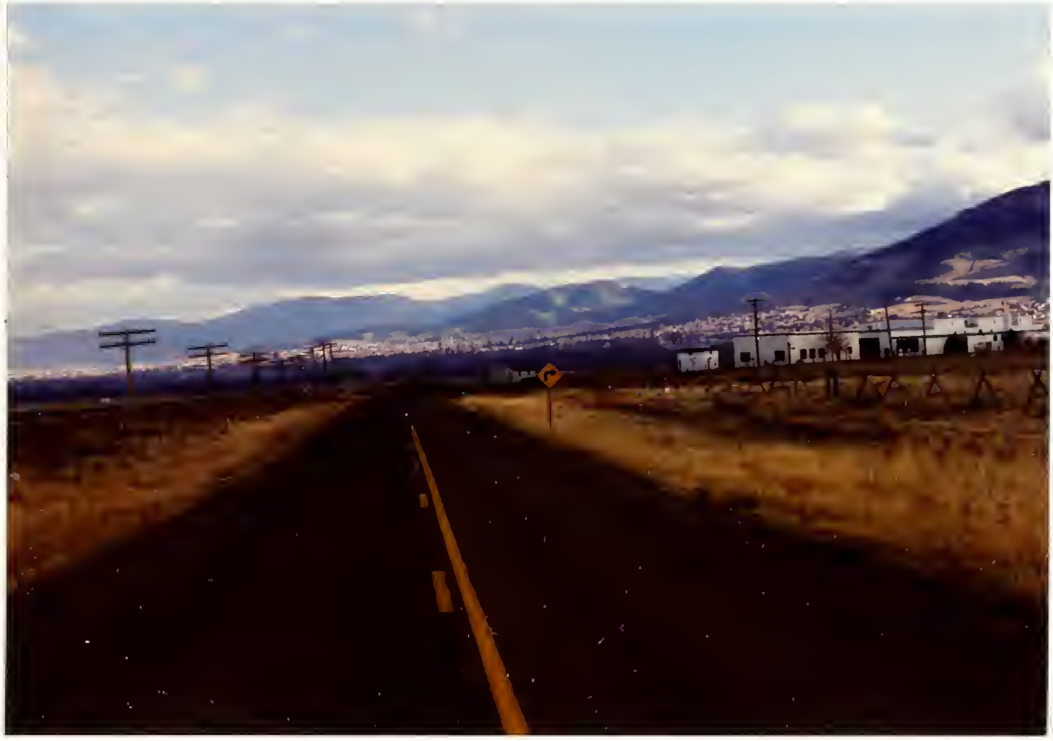
Lewis & Clark County

Recommended Improvements

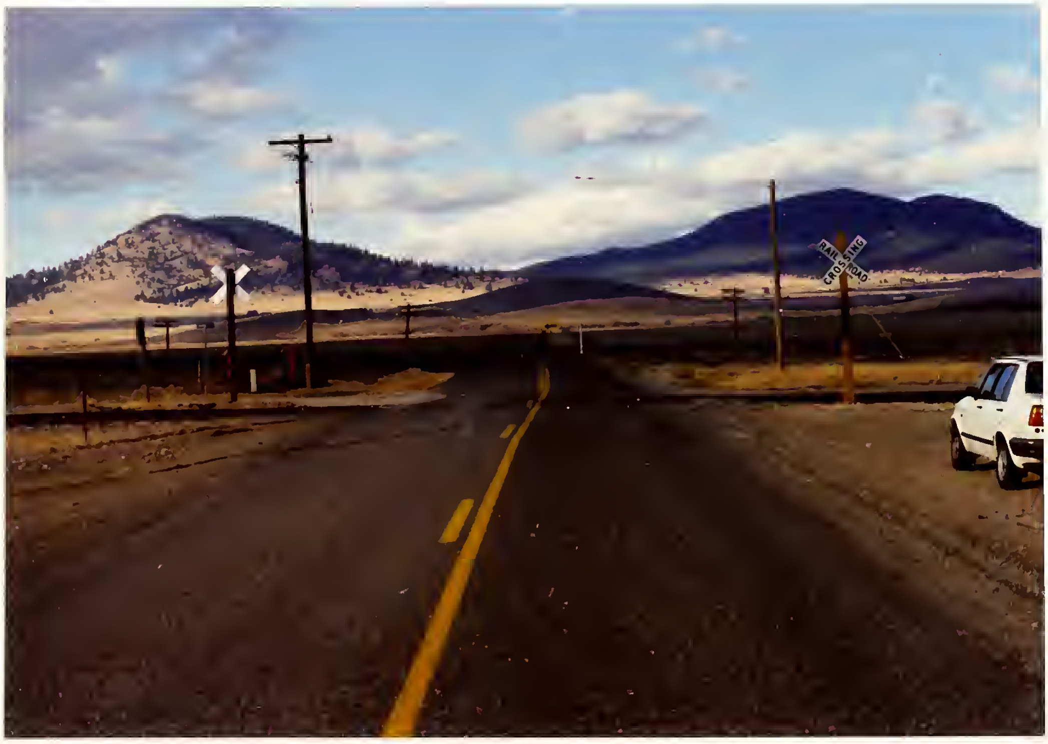
Beartooth Road- Curve

Fig. No.
13-2

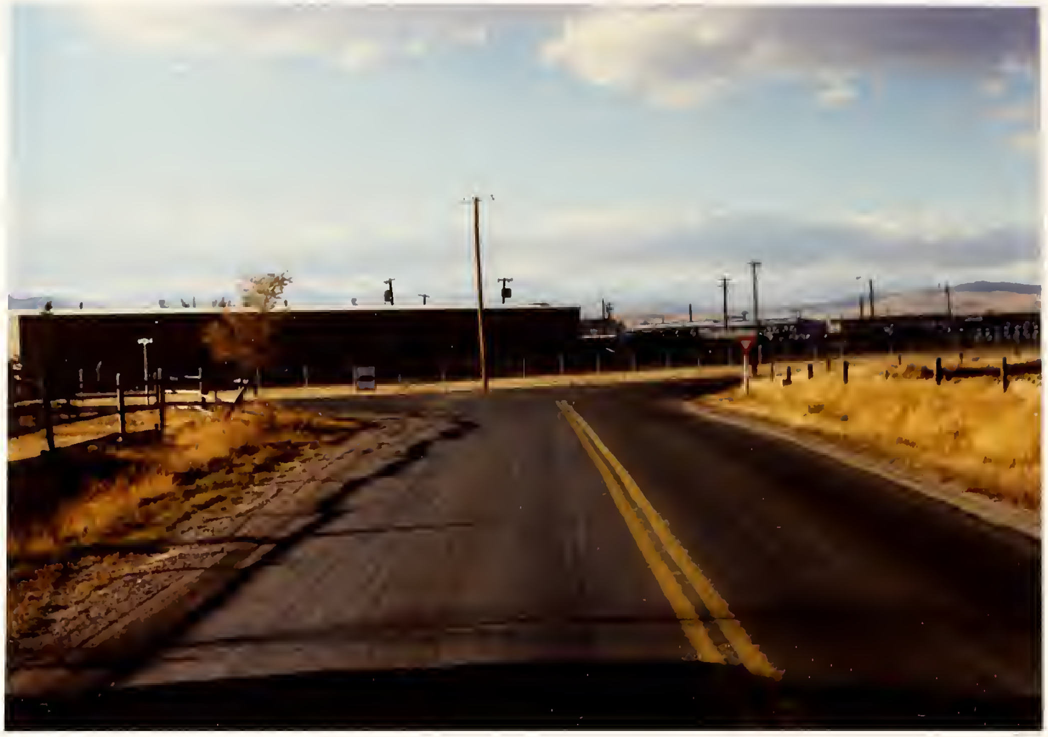
SITE NO. 14



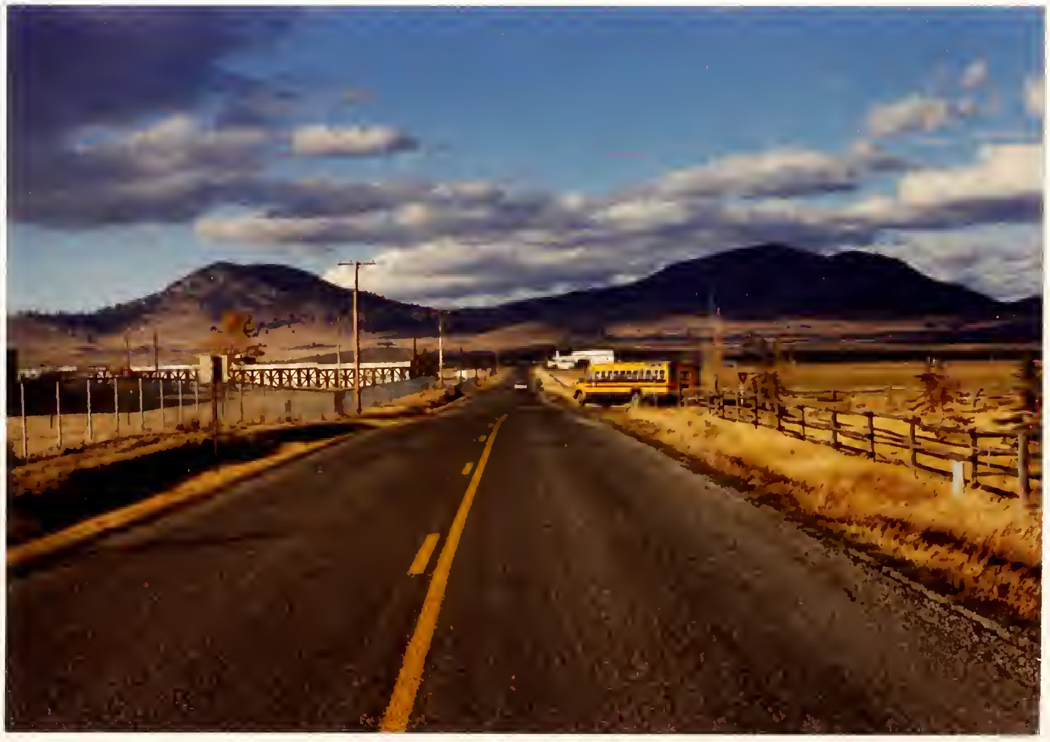
Site 14 - West Approach



Site 14 - North Approach



Site 14 - Southeast Approach



Site 14 - West Approach

SITE NO. 14

COUNTRY CLUB AVENUE - WILLIAMS STREET - BIRDSEYE ROAD

A. DESCRIPTION

This site is located approximately 2.0 miles northeast of the Helena City Limits. The site includes the intersection of Country Club Avenue and Williams Street and the intersection of Williams Street and Birdseye Road.

Country Club Avenue and Williams Street provide access to Fort Harrison and the Montana National Guard complex. It is expected that this traffic will increase in the next year due to expanded maintenance facilities at the National Guard complex. Birdseye Road provides access to a growing residential area north of Helena.

The 1988 average daily traffic is as follows:

Intersection of Williams Street and Country Club Avenue:

Leg	ADT
North	1,530
South	430

Southeast	2,195

Intersection of Williams Street and Birdseye Road:

Leg	ADT
Northwest	1,530
South	1,530

The existing site characteristics are shown on Figure 14-1.

B. ACCIDENT ANALYSIS

Four accidents occurred at this site during the four-year period from 1984 through 1987. The following is a summary of characteristics that are pertinent in determining factors that may have contributed to the accidents:

* Two (50 percent) of the accidents occurred on weekends.

* All of the accidents occurred during hours of darkness.

* All of the accidents occurred on a dry road.

* Three (75 percent) of the accidents involved single vehicles leaving the road.

- Two (50 percent) of the accidents occurred in the past two years.

- Alcohol was involved in one (25 percent) of the accidents.

- The investigating officers' analysis attributed the accidents to the following factors: alcohol and speed too fast for conditions.

Accident diagrams are shown on Figure 14-1. Table 14-1 summarizes accident characteristics at the site.

C. EVALUATION

The following factors pertaining to the site were determined from the field survey and accident analysis:

1. One accident occurred at the intersection of Country Club Avenue and Williams Street. This accident involved excessive speed and failure to negotiate the movement from the southeast leg of the intersection to the north leg.

2. The other three accidents involved southbound vehicles failing to negotiate the curve from Birdseye Road onto Williams Street.

D. RECOMMENDATIONS

The following improvements are recommended for this site:

1. Trim or relocate trees in the southwest quadrant of the intersection of Williams Street and Country Club Avenue to improve sight distance to the west.

2. Install a W2-3R, 30"x30" Side Road Right - 45° sign on the west approach and a W2-3L, 30"x30" Side Road Left - 45° sign on the east approach to the intersection of Williams Street and Country Club Avenue.

3. Install two Design D approach delineators on the southwest approach of the intersection of Williams Street and Country Club Avenue.

4. Install a W1-1L, 30"x30" TURN LEFT sign with a W13-1, 18"x18" 25 MPH advisory speed plate 600 feet in advance of the intersection of Williams Street and Birdseye Road.

5. Add a W13-1, 18"x18" advisory speed plate to the existing W1-1R, 30"x30" TURN RIGHT sign on the north approach to the intersection of Williams Street and Birdseye Road.

6. Install a W1-6, 48"x24" Large Arrow sign on the east side of the curve at the intersection of Williams Street and Birdseye Road.

7. Install seven 6-foot flexible Design A delineators on the east side of the curve at the intersection of Williams Street and Birdseye Road, spaced at 57.5 ft. on the curve and 115 ft. on the north tangent.

8. Install four Design D approach delineators on the approaches to the Montana National Guard complex.

9. Install a W3-2a, 30"x30" Yield Ahead sign on the southeast approach.

The recommended improvements are shown in Figure 14-2.

E. COST

1.	Trim trees	$200.00
2.	Install W2-3R, 30"x30" Side Road Right and W2-3L, 30"x30" Side Road Left signs	280.00
3.	Install six Design D approach delineators	60.00
4.	Install W1-1L, 30"x30" Turn Left sign with a W13-1, 18"x18" 25 MPH advisory speed plate	140.00

5.	Add a W13-1, 18"x18" 25 MPH advisory speed plate to existing turn sign	140.00
6.	Install W1-6, 48"x24" Large Arrow sign	140.00
7.	Install 7 6-ft. flexible Design A delineators	140.00
8.	Install a W3-2a, 30"x30" Yield Ahead sign	140.00
TOTAL COST		$1,240.00

F. HAZARD AND PRIORITY INDICES

Based on the information collected and the foregoing analysis, the hazard index for this location is determined to be 45.99. The priority index is 59.24. The calculations are shown in Table 14-2.

ACCIDENT SUMMARY

SITE NUMBER 14

ACCIDENT PERIOD 1984-1987

NUMBER OF ACCIDENTS BY YEAR

1984	1985	1986	1987
1	1	1	1

NUMBER OF ACCIDENTS BY DAY OF WEEK

Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
	1				1	2

NUMBER OF ACCIDENTS BY MONTH

Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	1						1		2		

-- AM -- NUMBER OF ACCIDENTS BY TIME OF DAY -- PM --

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
																			1	1		2	

NUMBER OF ACCIDENTS BY LIGHT CONDITIONS

Day-light	Dark	Dawn	Dusk
	4		

NUMBER OF ACCIDENTS BY ROAD CONDITIONS

Dry	Wet	Snow	Ice	Other
4				

NUMBER OF ACCIDENTS BY WEATHER CONDITIONS

Clear	Rain	Snow	Fog
4			

NUMBER OF ACCIDENTS BY ACCIDENT TYPE

Angle	Turn	Rear End	Fixed Object	Ped.	Animal	Side-swipe	Non-Col	Head-on	Backing
			1			1	2		

NUMBER OF ACCIDENTS BY POSSIBLE VIOLATION

No Violat.	Drinking	Reckless Driving	Speed	Right-of-Way	Improper Passing	Improper Backing	Improper Turning	Other
1	1		2					

NUMBER OF ACCIDENTS BY SEVERITY

	1984	1985	1986	1987
Injury	1		1	1
Fatality				
Property Dam. Only		1		

NUMBER OF ACCIDENTS ALCOHOL INVOLVED

1

HAZARD INDEX CALCULATION

Site Number 14 Date 10/15/88

Site Description Birdseye Road - Williams Street

Indicator	Data Value		Indicator Value		Weight		Partial H.I.'s
Number of Accidents	1.00	acc/yr	28	X	0.164	=	4.59
Accident Rate	1.79	acc/MVE	31	X	0.225	=	6.98
Accident Severity	$14,200	dollars	71	X	0.191	=	13.56
Volume/Capacity Ratio	0.38		57	X	0.082	=	4.67
Sight Distance Ratio	2.0	(wt.ave.)	0	X	0.074	=	-
Driver Expectancy	3.5	(wt.ave.)	57	X	0.149	=	8.49
Information System Deficiencies	4.0	(wt.ave.)	67	X	0.115	=	7.70

Hazard Index: 45.99

Cost of Recommended Improvements: $1,240.00

Cost Factor: 99

Priority Index = Hazard Index X .75 + Cost Factor X .25

45.99 X .75 + 99 X .25 = 59.24

Lewis & Clark County

SITE NO. 14

Existing Conditions & Accidents

Birdseye Road-Williams St.

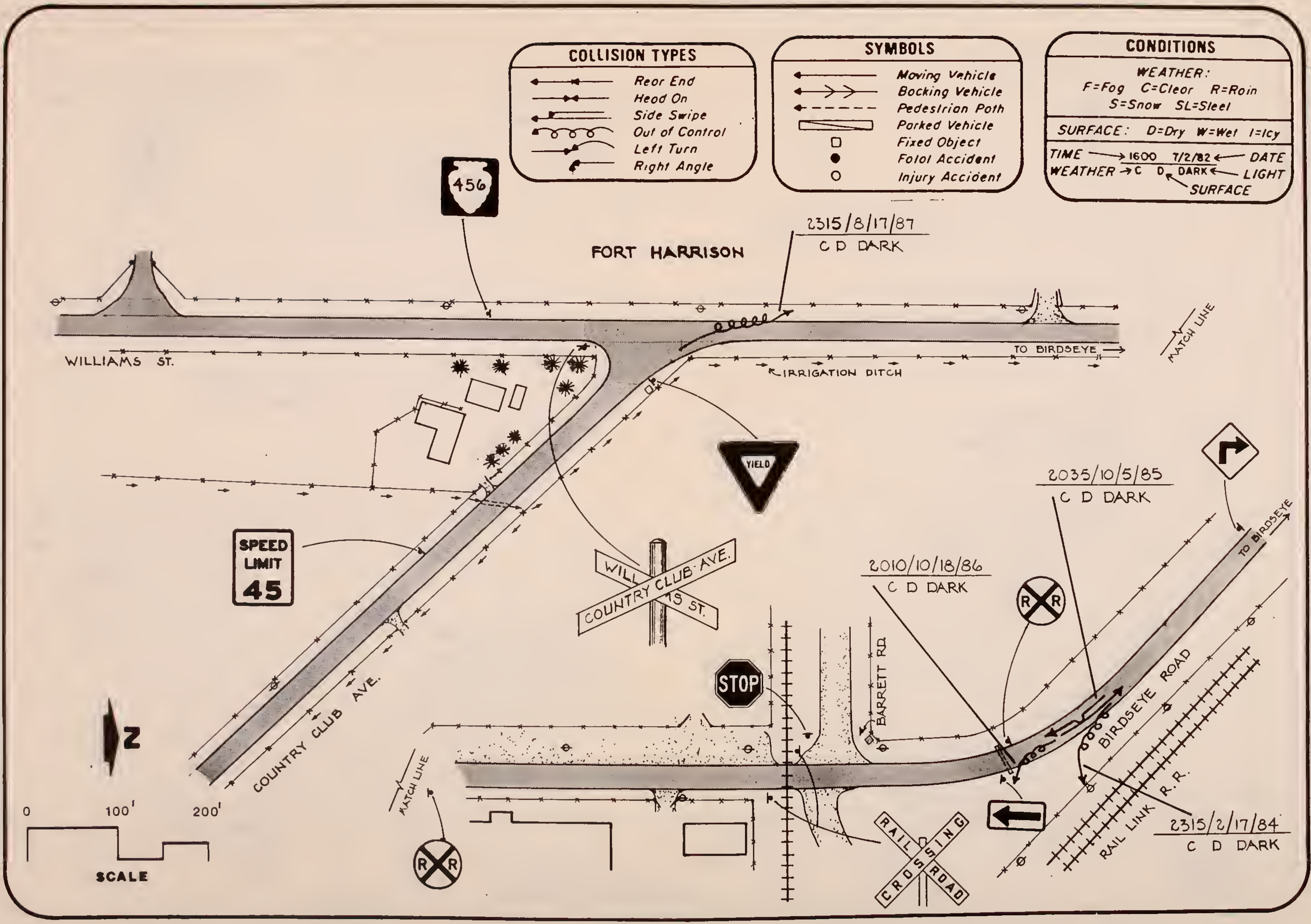
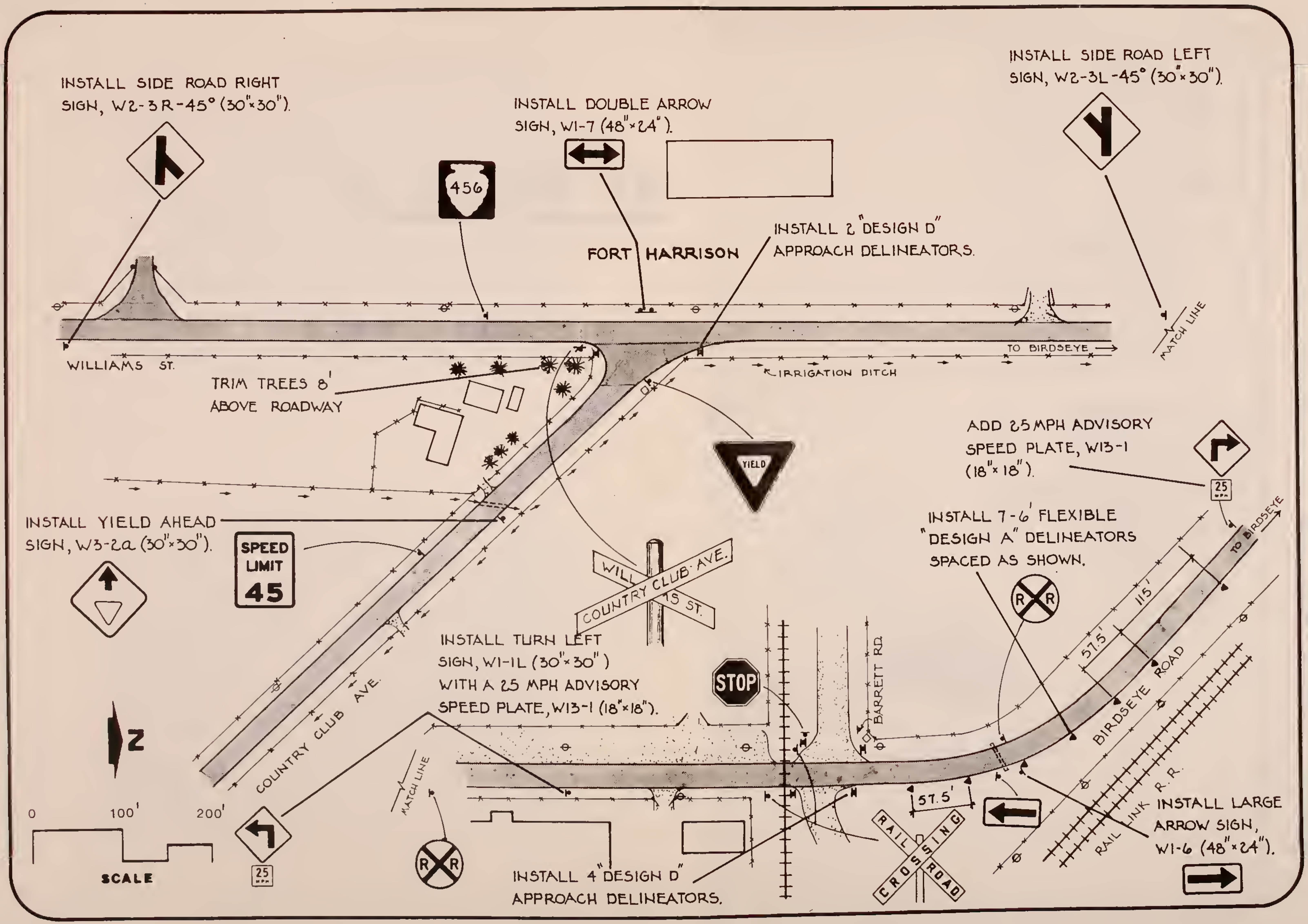


Fig. No.
14-1



INSTALL SIDE ROAD RIGHT SIGN, W2-3R-45° (30"×30").

INSTALL DOUBLE ARROW SIGN, W1-7 (48"×24").

INSTALL SIDE ROAD LEFT SIGN, W2-3L-45° (30"×30").

INSTALL 2"DESIGN D" APPROACH DELINEATORS.

TRIM TREES 8' ABOVE ROADWAY

ADD 25 MPH ADVISORY SPEED PLATE, W13-1 (18"×18").

INSTALL YIELD AHEAD SIGN, W3-2a (30"×30").

INSTALL 7-6' FLEXIBLE "DESIGN A" DELINEATORS SPACED AS SHOWN.

INSTALL TURN LEFT SIGN, W1-1L (30"×30") WITH A 25 MPH ADVISORY SPEED PLATE, W13-1 (18"×18").

INSTALL LARGE ARROW SIGN, W1-6 (48"×24").

INSTALL 4"DESIGN D" APPROACH DELINEATORS.

Recommended Improvements

Birdseye Road-Williams St.

SITE NO. 14

Lewis & Clark County

Fig. No. 14-2

SITE NO. 15

Site 15 - East Approach

Site 15 - West Approach

SITE NO. 15

LE GRANDE CANNON BOULEVARD - CURVES

A. DESCRIPTION

This site is located approximately 1.0 mile west of the west Helena City limits. The site is located in Section 27, Range 4W, Township 10N.

Le Grande Cannon Boulevard is a gravel road serving scattered residential development along the road. The road is also a scenic drive which provides a vista of the city of Helena and the Helena valley. The road is also used by walkers and joggers.

There are very few traffic signs on the entire road which extends from U.S. Highway 12 on the west to Hayes Avenue on the east. The general character of the road is narrow and winding. Grades are relatively level.

The 1988 average daily traffic at this site is 44 vpd.

The existing site characteristics are shown on Figure 15-1.

B. ACCIDENT ANALYSIS

Five accidents occurred at this site during the four-year period from 1984 through 1987. The following is a summary of characteristics that are pertinent in determining factors that may have contributed to the accidents:

- Three (60 percent) of the accidents occurred on weekends.
- Four (80 percent) of the accidents occurred during hours of dusk or darkness.
- Three (60 percent) of the accidents occurred when the road condition was snowpacked or icy.
- All accidents involved single vehicles leaving the road.
- Four (80 percent) of the accidents resulted in property damage only.
- The investigating officers' analysis attributed the accidents to the following driver-related factors: speed too fast for conditions and careless driving.

Accident diagrams are shown on Figure 15-1. Table 15-1 summarizes accident characteristics at the site.

C. EVALUATION

The following factors pertaining to the site were determined from the field survey and accident analysis:

1. The curves on this section of road were ball banked at 15 MPH.

2. Although this particular section of road had the most definitive cluster of accidents, these three curves are typical of the other sections of the road. Because of this, general signing to cover the entire road appears to be the most feasible treatment.

D. RECOMMENDATIONS

The following improvements are recommended for this site:

1. Install W1-5, 30"x30" Winding Road signs with W13-1, 18"18" 15 MPH advisory speed plates, 250 feet in advance of the first curve on the east and west approaches to the winding road section.
2. Install a W1-6, 48" x 24" Large Arrow sign on the north curve.

The recommended improvements are shown in Figure 15-2.

E. COST

1.	Install 2 W1-5, 30"x30" Winding Road signs with W13-1, 18"x18" 15 MPH Advisory Speed Plates	$280.00
2.	Install W1-6, 48"x24" Large Arrow sign	140.00
TOTAL COST		$420.00

F. HAZARD AND PRIORITY INDICES

Based on the information collected and the foregoing analysis, the hazard index for this location is determined to be 68.21. The priority index is 75.91. The calculations are shown in Table 15-2.

ACCIDENT SUMMARY

SITE NUMBER 15

ACCIDENT PERIOD 1984-1987

NUMBER OF ACCIDENTS BY YEAR

1984	1985	1986	1987
2	2		1

NUMBER OF ACCIDENTS BY DAY OF WEEK

Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
2		1	1			1

NUMBER OF ACCIDENTS BY MONTH

Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
2		1		1							1

-- AM -- NUMBER OF ACCIDENTS BY TIME OF DAY -- PM --

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
																1		1			1	1	1

NUMBER OF ACCIDENTS BY LIGHT CONDITIONS

Day-light	Dark	Dawn	Dusk
1	3		1

NUMBER OF ACCIDENTS BY ROAD CONDITIONS

Dry	Wet	Snow	Ice	Other
2		1	2	

NUMBER OF ACCIDENTS BY WEATHER CONDITIONS

Clear	Rain	Snow	Fog
5			

NUMBER OF ACCIDENTS BY ACCIDENT TYPE

Angle	Turn	Rear End	Fixed Object	Ped.	Animal	Side-swipe	Non-Col	Head-on	Backing
			5						

NUMBER OF ACCIDENTS BY POSSIBLE VIOLATION

No Violat.	Drinking	Reckless Driving	Speed	Right-of-Way	Improper Passing	Improper Backing	Improper Turning	Other
1		1	3					

NUMBER OF ACCIDENTS BY SEVERITY

	1984	1985	1986	1987
Injury	1			
Fatality				
Property Dam. Only	1	2		

NUMBER OF ACCIDENTS ALCOHOL INVOLVED

0

HAZARD INDEX CALCULATION

Site Number 15 Date

Site Description LE GRANDE CANNON BLVD. - CURVE

Indicator	Data Value		Indicator Value		Weight		Partial H.I.'s
Number of Accidents	1.25	acc/yr	31	X	0.164	=	5.08
Accident Rate	7.88	acc/MVE	100	X	0.225	=	22.50
Accident Severity	$12,400	dollars	69	X	0.191	=	13.18
Volume/Capacity Ratio	.01		3	X	0.082	=	0.25
Sight Distance Ratio	<.5	(wt.ave.)	100	X	0.074	=	7.4
Driver Expectancy	4.5	(wt.ave.)	75	X	0.149	=	11.18
Information System Deficiencies	4.5	(wt.ave.)	75	X	0.115	=	8.62

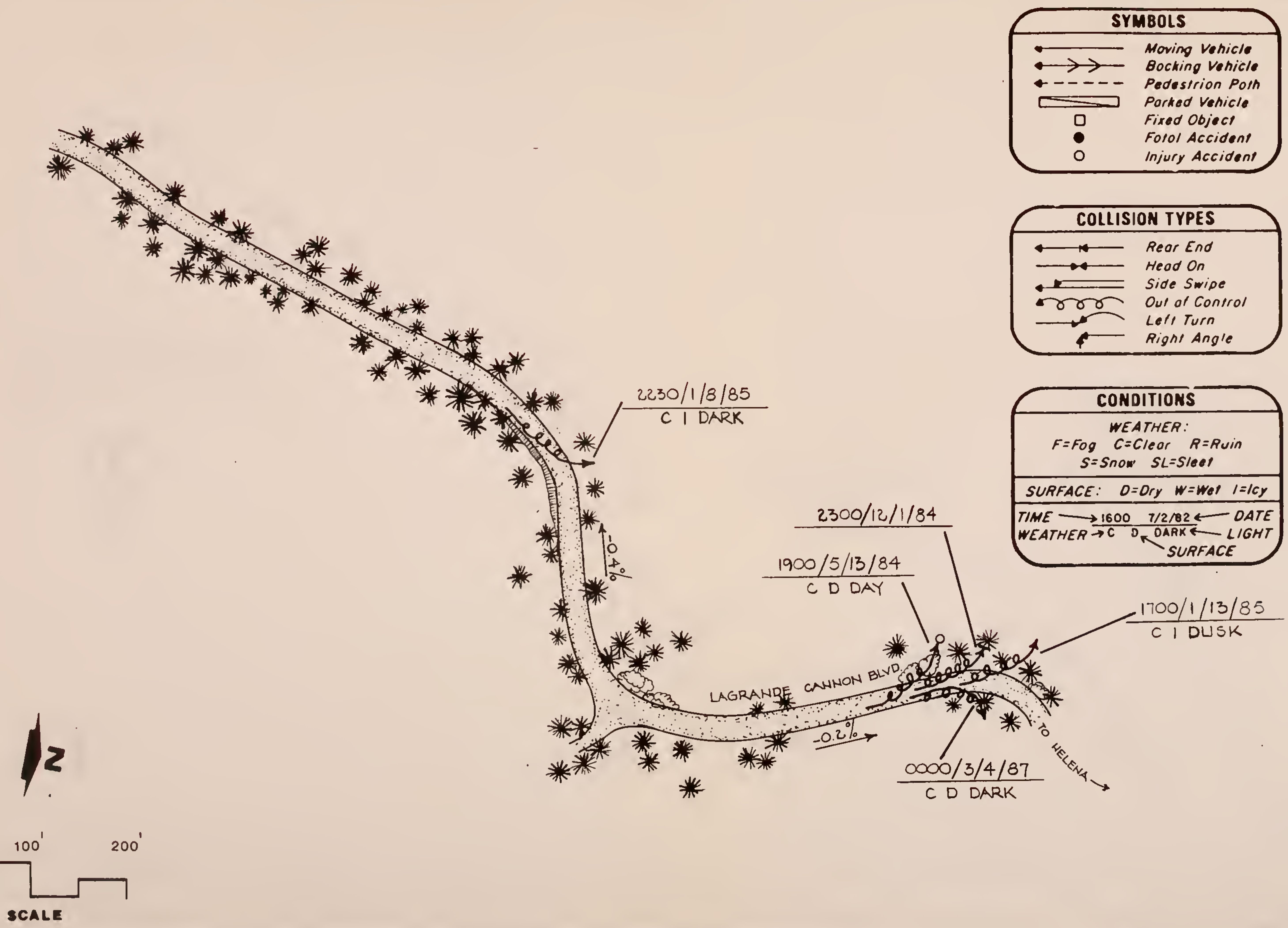
Hazard Index: 68.21

Cost of Recommended Improvements: $420.00

Cost Factor: 99

Priority Index = Hazard Index X .75 + Cost Factor X .25

68.21 X .75 + 99 X .25 = 75.91



SITE NO. 15

Lewis & Clark County

Existing Conditions & Accidents

Lagrande Cannon Blvd.-Curve

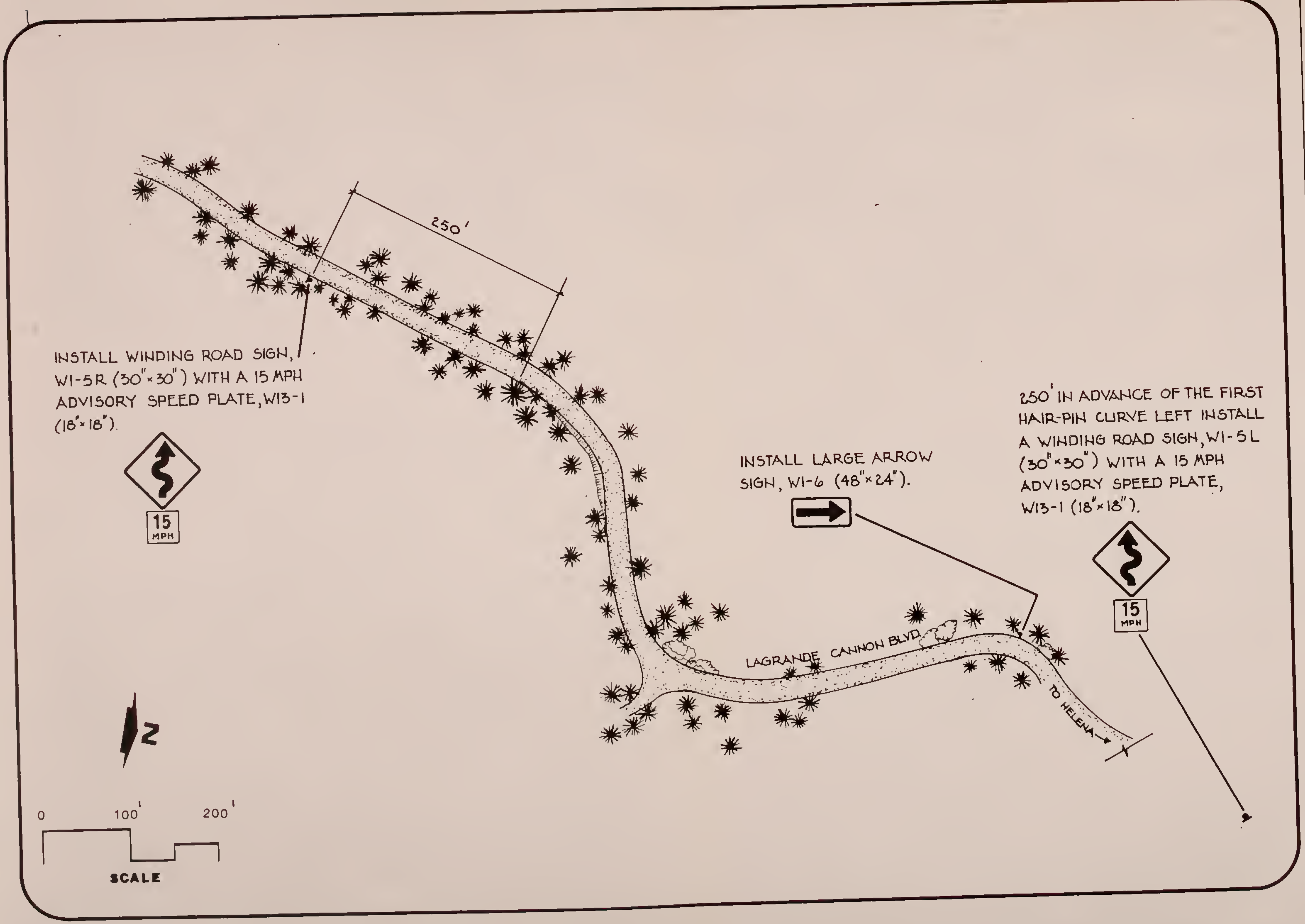
Fig. No.
15-1

Recommended Improvements

Lagrande Cannon Blvd.-Curve

SITE NO. 15

Lewis & Clark County



INSTALL WINDING ROAD SIGN, W1-5R (30"×30") WITH A 15 MPH ADVISORY SPEED PLATE, W13-1 (18"×18").

INSTALL LARGE ARROW SIGN, W1-6 (48"×24").

250' IN ADVANCE OF THE FIRST HAIR-PIN CURVE LEFT INSTALL A WINDING ROAD SIGN, W1-5L (30"×30") WITH A 15 MPH ADVISORY SPEED PLATE, W13-1 (18"×18").

Fig. No. 15-2

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